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Software Engineering Institute

Army Strategic Software Improvement Program (ASSIP) Survey of Army Acquisition Program Management

Results of the 2003 Survey of Army Acquisition Managers

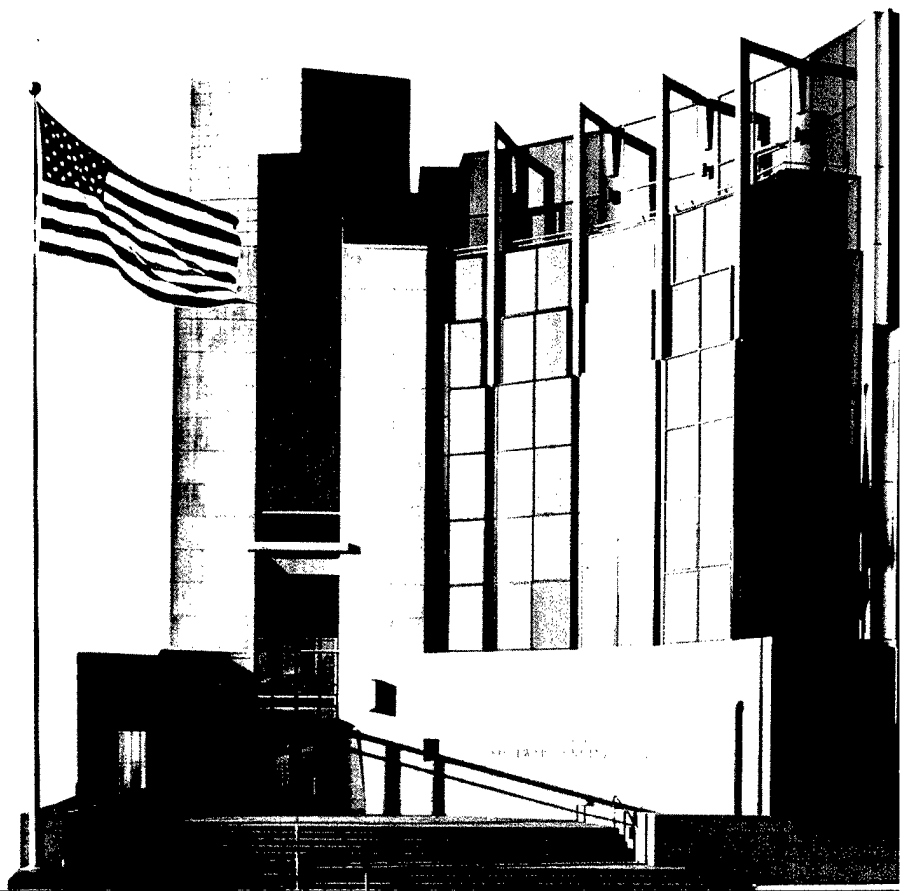
Mark Kasunic

March 2004

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TECHNICAL REPORT
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**CarnegieMellon
Software Engineering Institute**

Pittsburgh, PA 15213-3890

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Mark Kasunic

March 2004

Software Engineering Process Management

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FOR THE COMMANDER



Christos Scondras
Chief of Programs, XPK

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Executive Summary

ASSIP	<p>The U.S. Army Strategic Software Improvement Program is referred to throughout this report as ASSIP.</p> <p>The ASSIP is a long-term effort focusing on acquisition programs, people, production and sustainment, and the institutionalization of continuous improvement.</p>
This survey	<p>This study was conducted by the Software Engineering Institute (SEI) on behalf of ASSIP. The survey (whose results are reported herein) is one of several information-gathering approaches to support effective decision making within the ASSIP.</p>
Survey participants	<p>The intended audience targeted for participation in this survey are Army program managers who are responsible for the acquisition of software-intensive systems. A total of 150 individuals participated in this survey.</p>
Objectives	<p>The objectives of this initial survey were to</p> <ul style="list-style-type: none">• provide preliminary insight into the major acquisition-related problem areas (as perceived by Army program managers) so that improvement opportunities can be prioritized• assist planning of future data collection activities by shedding light on the problem space, thereby exposing areas that should be the object of more detailed analysis as part of future data gathering efforts
Scope	<p>In this survey, the researchers were requested to cover four areas of the acquisition system including</p> <ol style="list-style-type: none">1. the acquirer's environment2. communication between the acquirer and developer3. the developer's environment4. factors that are external to the Acquisition System (but may impact it)
Interpreting the results	<p>This survey is only one part of an overall data-gathering approach to understand the state of the Army Acquisition System. Therefore, the results should not be viewed as conclusive, but should be used with other sources of information for proper interpretation. Due to sampling issues (explained in the body of this report), results cannot be generalized to the overall population of Army Acquisition Managers.</p>
Major Theme	<p><i>Requirements management</i> is a primary area of concern to Army acquisition program managers who responded to this survey.</p> <p>Other areas that should be further explored as potential areas for high-impact improvement include</p>

- unstable funding
- solicitation
- required skills
- risk management
- transition-to-support
- Interoperability
- project management

Abstract

This report analyzes a survey that the Software Engineering Institute conducted on behalf of the Army Strategic Software Improvement Program (ASSIP). The survey was directed to Army program managers (PMs) and covered four areas of the acquisition system: the acquirer's environment, the developer's environment, communication between the acquirer and developer, and external factors that could affect the acquisition system. The study aimed to discover how PMs perceived major acquisition-related problem areas and to provide preliminary data upon which to base future data-gathering activities. Although the survey results were not conclusive, they indicated that requirements management was a primary area of concern among those who responded to the survey.

1 Document Overview

Introduction This section discusses how the document is organized.

Document format The document was designed to support a broad audience of readers with varying degrees of information need. The intent is to chunk and label information to support scanning (for example, for those who are familiar with aspects of the ASSIP), while also providing accessible detail to those who have a more comprehensive need for information.

A number of sections contain overviews. The purpose of the overview is to provide information that is relevant for the subsections covered by the overview. The overview also acts as an information organizer to provide readers with advance notice of what to expect in that section.

How this document is organized This table lists the major sections of this document and describes the content of each.

Section title	Description
Executive summary	An abstract of this document.
Overview of ASSIP [†]	ASSIP is the improvement program for which this survey was conducted.
ASSIP data-gathering approach	The survey is only one aspect of the overall ASSIP data-gathering approach. This section describes the overall approach and how this survey is part of it.
About the survey	Describes the objectives and scope for this survey.
Survey method	Describes the method used for designing the survey instrument and distributing it.
Description of the survey sample	Graphical charts describing various characteristics of the surveyed audience.
Survey results	Reports the results in chart format supplemented by tabular information.
Observations and interpretations	Provides interpretation guidelines. Discusses the results and highlights noteworthy outcomes.
Major themes	Synthesizes key observations into major themes.
Summary	A synopsis of the report including next steps.
Appendix	The questionnaire instrument used in this survey.

[†] ASSIP is Army Strategic Software Improvement Program.

2 Overview of ASSIP

Introduction The survey work was conducted on behalf of the ASSIP initiative. This section provides background and information about ASSIP to provide context for the survey effort.

What is ASSIP? ASSIP stands for Army Strategic Software Improvement Program.
The ASSIP is a long-term effort focusing on acquisition programs, people, production and sustainment, and the institutionalization of continuous improvement.

Established by The ASSIP was established by the Assistant Secretary of the Army for Acquisition, Logistics and Technology [ASA(ALT)].

Purpose The purpose of ASSIP is to take actions to improve the acquisition of Army software-intensive systems acquired for soldiers in pursuit of the Army's Objective Force.

ASSIP working groups This table lists and describes the key working bodies for guiding the implementation of ASSIP.

Group	Description
Senior Steering Group (SSG)	ASA(ALT) Military Deputy (MILDEP), Program Executive Officers (PEOs) and the SEI Director exercise management and control over ASSIP.
ASSIP Action Group (AAG)	Approximately 15 representatives of PEOs who act as the development arm of SSG.
ASSIP Team	SEI team that acts as Secretariat supporting the SSG and AAG.

Improvement vehicle The Strategic Software Improvement Master Plan (SSIMP) is the mechanism by which improvement initiatives are introduced into the Army acquisition system. The SSIMP

- is the annual document that describes the approach for implementation and insitutionalization of the ASSIP during a specific fiscal year;
- contains a suite of actionable improvement initiatives;
- is revised on an annual basis in response to data (e.g., surveys and depth interviews), performance-based measures, and lessons

learned from implementing the plan during the previous year.

**Purpose of this
survey**

Informed decision making requires adequate information about the situation. The survey (whose results are reported herein) is one of several information-gathering approaches to support effective decision making within the ASSIP.

3 ASSIP Data-Gathering Approach

Introduction

The intent of ASSIP is to emphasize a data collection and analysis strategy that promotes the use of objective, valid information to guide the identification and prioritization of improvement opportunities in the Army acquisition environment.

This section provides a brief overview of the data-gathering approach.

Data triangulation

Data triangulation refers to the use of multiple data collection and analysis methods whereby the strengths of one method compensate for the weaknesses of another.

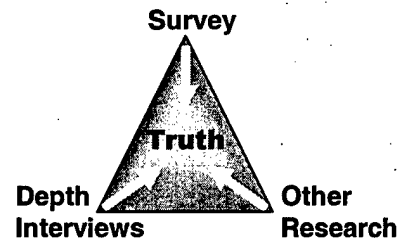
The purpose of triangulation is to obtain confirmation of findings through convergence of different perspectives. The point at which the perspectives converge is seen to represent reality.

ASSIP use of triangulation

Getting to the *truth* about a system or a complex situation is difficult.

Our survey method is but one of several data-gathering approaches for understanding the state of the Army acquisition system. Other approaches include:

- in-depth interviews at selected Army acquisition sites
- consultations with members of the ASSIP Action Group (AAG)
- interviews with acquisition subject matter experts
- research to explore the results of other acquisition-based data analysis efforts, assessments, and relevant reports on the state of the practice



In-depth interviews

The ASSIP Team is conducting a number of in-depth interviews at Army acquisition sites. These are being referred to as "Program-Wide Benchmarking for Improvement" events.

The interviews are designed as open-ended exchanges with knowledgeable individuals from the particular acquisition program.

The goal of these activities is to enable the organization to come to a more common understanding of its improvement issues, opportunities, and current best practices.

Surveys

The results reported in this document represent the initial examination of the Army acquisition system. The plan is to conduct an annual survey to obtain a snapshot that portrays key aspects of the Army acquisition system.

Information derived from these surveys will be triangulated with other sources (e.g., depth interviews and other valid sources of information).

4 About the Survey

Introduction

The 2003 survey of Army acquisition program managers was the initial ASSIP data-gathering event.

Objectives

The objectives of this initial survey were to

- provide preliminary insight into the major acquisition-related problem areas (as perceived by Army program managers) so that improvement opportunities can be prioritized
- assist development of future data collection activities by shedding light on the problem space, thereby allowing more detailed data-gathering to be conducted (in the future) in the identified focus areas

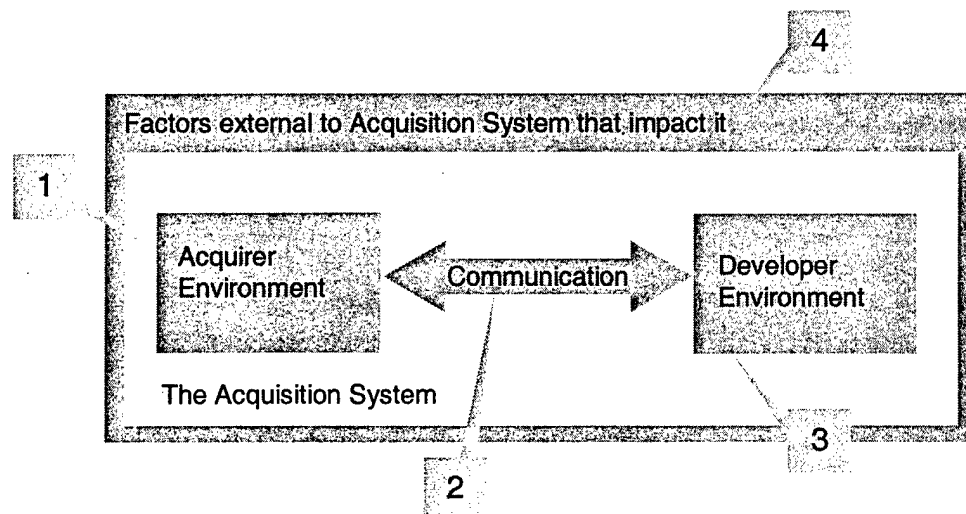
Scope of survey

Typically, the research area for a survey is narrowly scoped to take into account the limitations of using such a method. For example, response rates can be drastically affected by the size of the questionnaire. Therefore, one must keep the size and time-to-complete within reason.

When a broad topic is selected as the survey focus, then obtaining adequate coverage of issues implies that the information obtained is rather superficial.

In this survey, the researchers were requested to cover four rather broad areas associated with understanding the acquisition system. These are diagramed below and include

1. the acquirer's environment
2. communication between the acquirer and developer
3. the developer's environment
4. factors that are external to the acquisition system (e.g., congressional mandates, personnel turnover due to military leave)



5 Survey Method

Introduction	This section describes the process used for the design and distribution of the survey.
Survey content resources	<p>A number of resources were investigated as potential sources of content material for this survey. Those that had a primary impact on defining the content of this survey included the following:</p> <ul style="list-style-type: none">• Software Acquisition Capability Maturity Model (SA-CMM)• Literature search on acquisition best practices• Previous acquisition-based surveys, assessments, etc.• Subject matter expertise at the SEI• AAG questionnaire results (i.e., top 5 problems, issues, risks)• AAG input and feedback
How the content was defined	<p>The major steps of survey content definition included the following</p> <ol style="list-style-type: none">1. Define and validate survey objectives with team and stakeholders.2. Draft questions.3. Review and obtain feedback from ASSIP Team.4. Revise questions and develop draft survey instrument.5. Present instrument to AAG and customer point of contact for review and feedback.6. Review AAG feedback and revise survey instrument.7. Conduct final review of survey instrument with ASSIP Team.8. Conduct final edit of survey instrument.
Survey format	<p>The survey was a structured, self-administered questionnaire that was available both electronically via the World Wide Web and in paper form.</p> <p>The questions were phrased in pre-coded "close-ended" format. In addition, there were two "open-ended" questions so that respondents could elaborate their opinions and suggestions for improvement.</p>
Distribution of survey	<p>The survey was a Web-based instrument that was available via the SEI's external server site.</p> <p>The AAG Chair emailed members of the AAG requesting that they contact program managers within their organization to complete the Web-based survey.</p> <p>The response window for the survey was originally set for two weeks. As the deadline approached, management decided to extend the deadline for an</p>

additional three and a half weeks.

A number of reminder emails (from both the AAG Co-Chair and from the Secretariat) were sent to AAG members to encourage 100 percent participation of their managers.

6 Description of the Survey Sample

Introduction

Characteristics of the survey sample are presented in this section. Areas of interest included information that profiled both the respondent and the respondent's organization.

Target audience

The target audience for this survey was Army acquisition program managers. There is variation to how this term is applied and so we included as part of the intended survey audience individuals who identified themselves as

- Program Managers
- Project Managers
- Product Managers
- Project Directors

Not a random sample

To enable generalizations to be made from any survey, the researcher must be very careful to ensure that an appropriate random sample is obtained from the population under study. When a random sample is generated, the researcher can then be confident that the sample actually represents the population of interest.

In this study, it was not possible to obtain a random sample. Program managers (from the Army acquisition community) were requested to participate in this survey, and so respondents were self-selected. We had limited insight into the home organization of participants who responded to this survey anonymously.

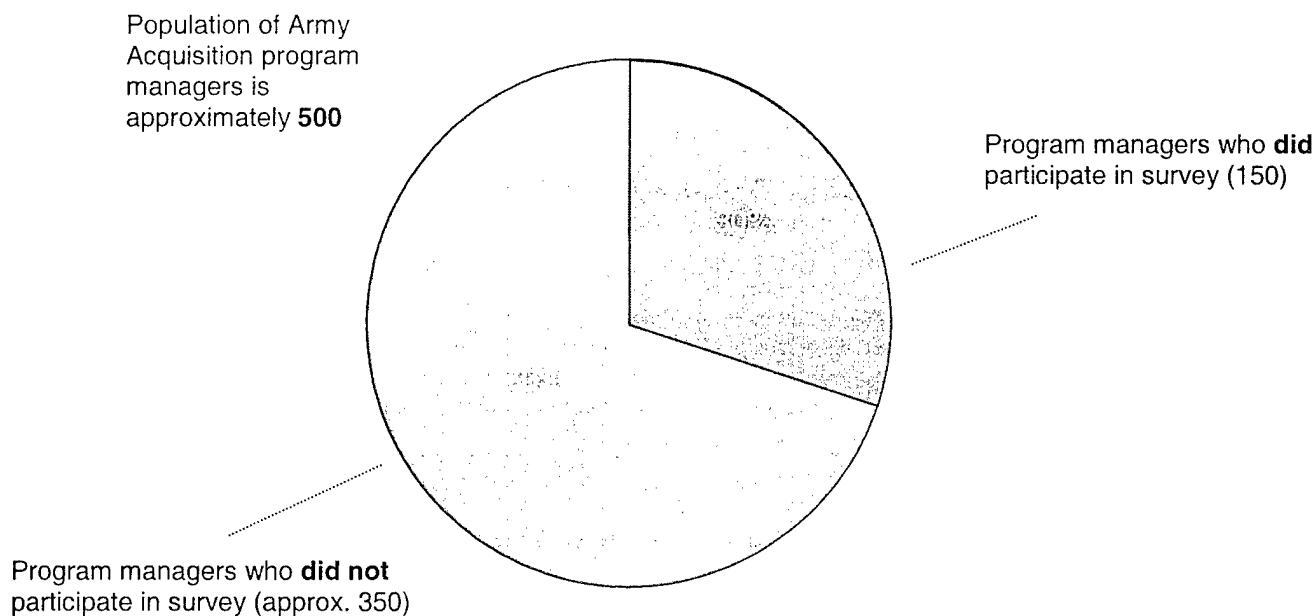
Since an appropriate random sample was not obtained, the results of this survey cannot be generalized to the overall population of Army acquisition program managers (who are responsible for software-intensive systems).

Sample contamination

Most of the respondents were program managers. However, in some cases, it appears that the task of responding to this survey was delegated to other individuals within the organization including

- Software Engineers (14, 9%)
- Contractors (6, 4%)
- Team Leaders (6, 4%)

Figure 1: Proportion of Army acquisition managers who responded to this survey.



Respondents

Based on information obtained from the RDAISA* Database, there is a total of approximately 500 acquisition managers in the Army Acquisition Workforce.

Approximately 150 Acquisition managers participated in this survey.[†]

Approximately 350 Acquisition managers did not participate in the survey. Of these, some are not responsible for software-based acquisition and so were not included in the request for participation. However, it is unknown what proportion of the overall population that this represents.

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* RDAISA is Army Research Development and Acquisition Information Systems Activity. The information in this database changes over time. The most recent information from this database (during the final edit of this report) indicates that there are actually 576 programs under the control of ASA(ALT). However, not all of these programs include software as a component.

[†] In some cases, it appears that the survey was delegated by the Program Manager to someone else in the organization to complete. (See Figure 3.)

**What organizations
are respondents
from?**

In general, we know little about the home organization of the respondents. During and after the time that the survey was accessible on the Internet, respondents were requested to notify their ASSIP Action Group (AAG) representative to inform them as to whether they had completed the survey.

Fifty of the respondents did report that they had completed the survey. This table lists the organization and the number of respondents from each organization who reported that they did complete the survey.

This information was self-reported and there is no way for us to independently validate this information.

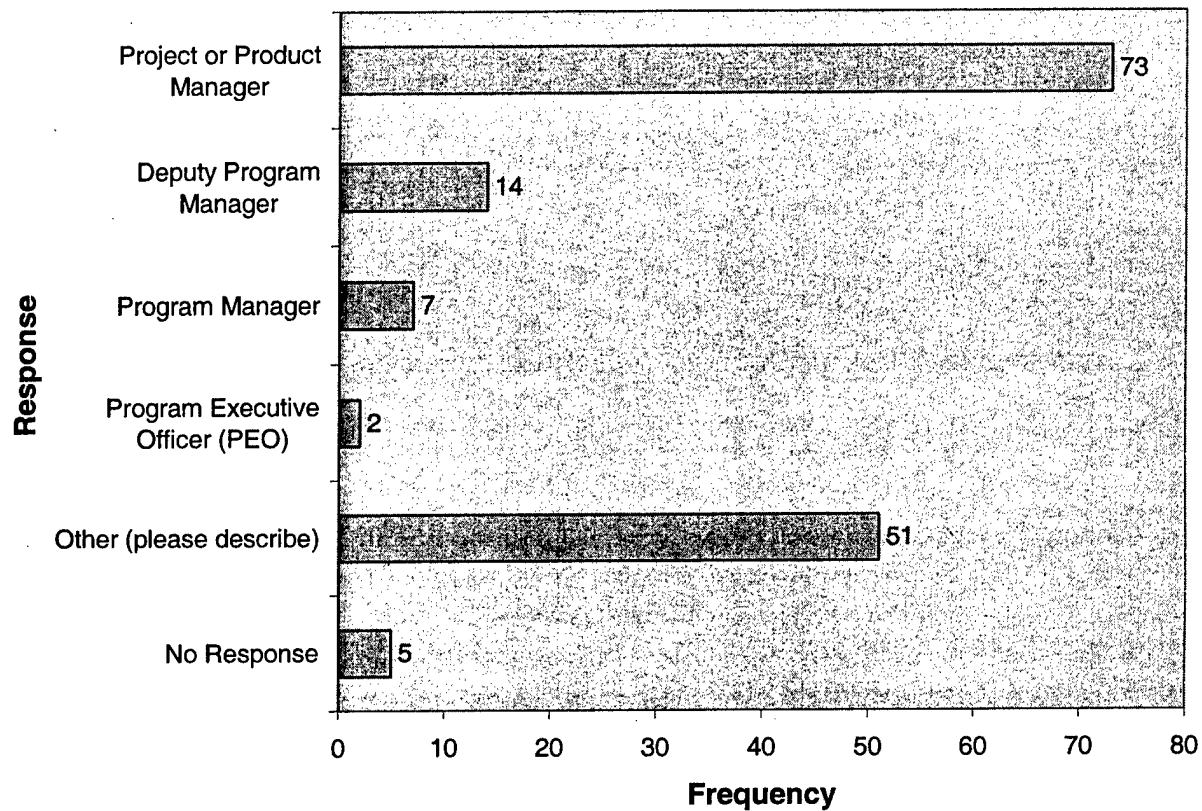
Organization	# Respondents
PEO STRI	4
PEO IEWS	20
PEO AMMO	6
JTRS JPO	1
USA PEO C3T	19
Unknown	100

**Respondent
Role**

Respondents were asked to indicate the role that best describes their position within the organization. Figure 2 displays the results.

A majority of the respondents identified themselves as Project or Product Managers (48%).

Figure 2: Role of respondent within organization

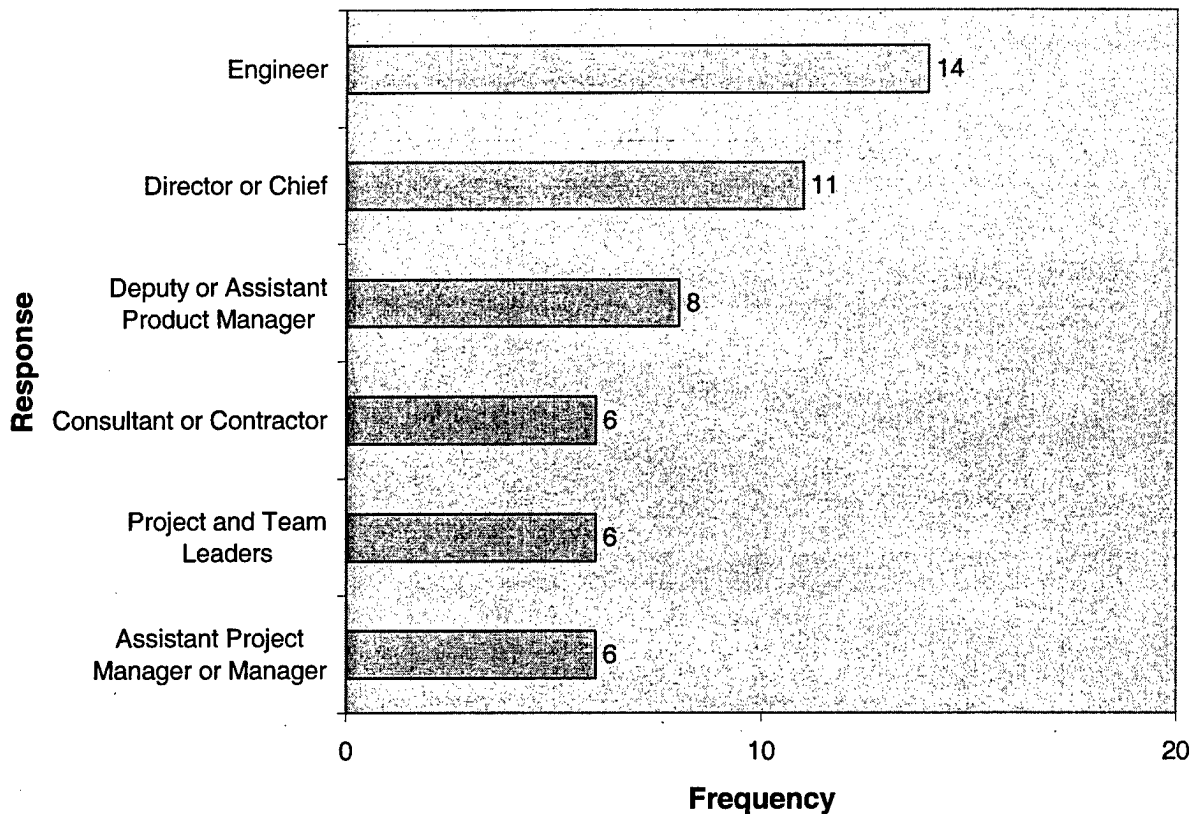


“Other” category

Thirty-four percent of the respondents chose “Other” from the provided responses. Figure 3 (on the following page) shows a summary of the role that this category described.

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Figure 3: Role description for “Other” category (of Figure 2)



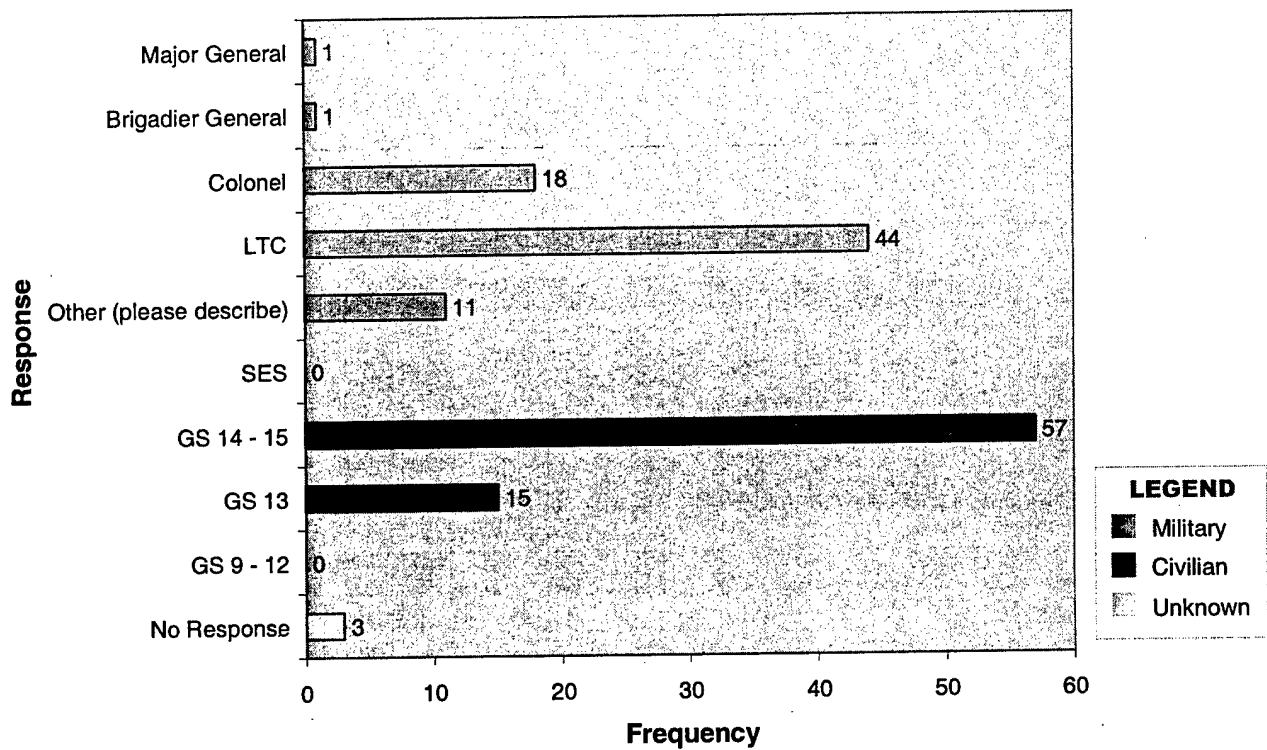
Contamination of sample

Instructions for this survey stated that the respondent should be a project or product manager within the organization. Yet it appears that the sample was contaminated with individuals who were not intended as part of the sample.

One could speculate that the request (for participation) was delegated by the project manager to someone who was perceived to be more qualified to respond to the questions (that focus on the software aspect of systems). One could also speculate that the respective project manager responded to the survey and *also* requested staff members (within their group) to respond as well. However, the actual circumstances are unknown to the researcher.

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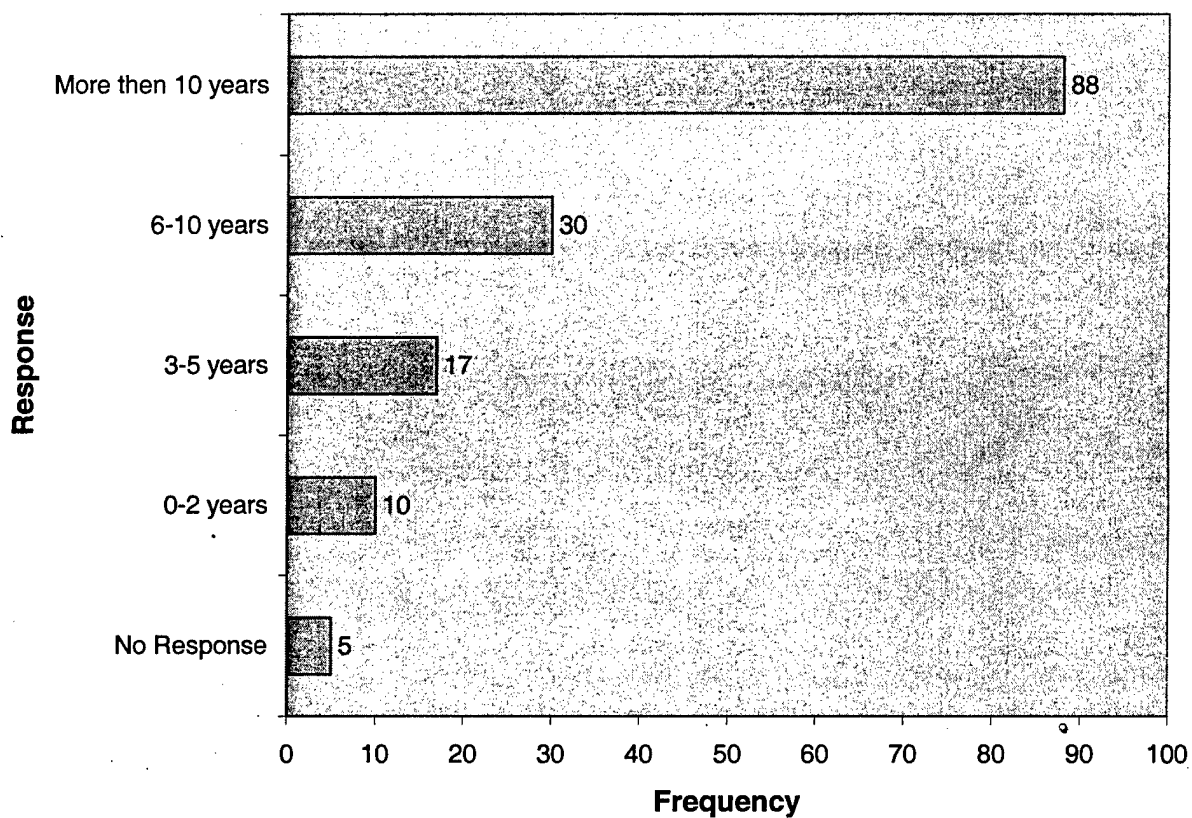
Figure 4: Rank or Job Classification of Respondent



Summary	Total number	150
	GS 14-15	38%
	LTC	29%
	Colonel	12%
	GS 13	10%
	Other	7%
	General	1%
	No Response	2%

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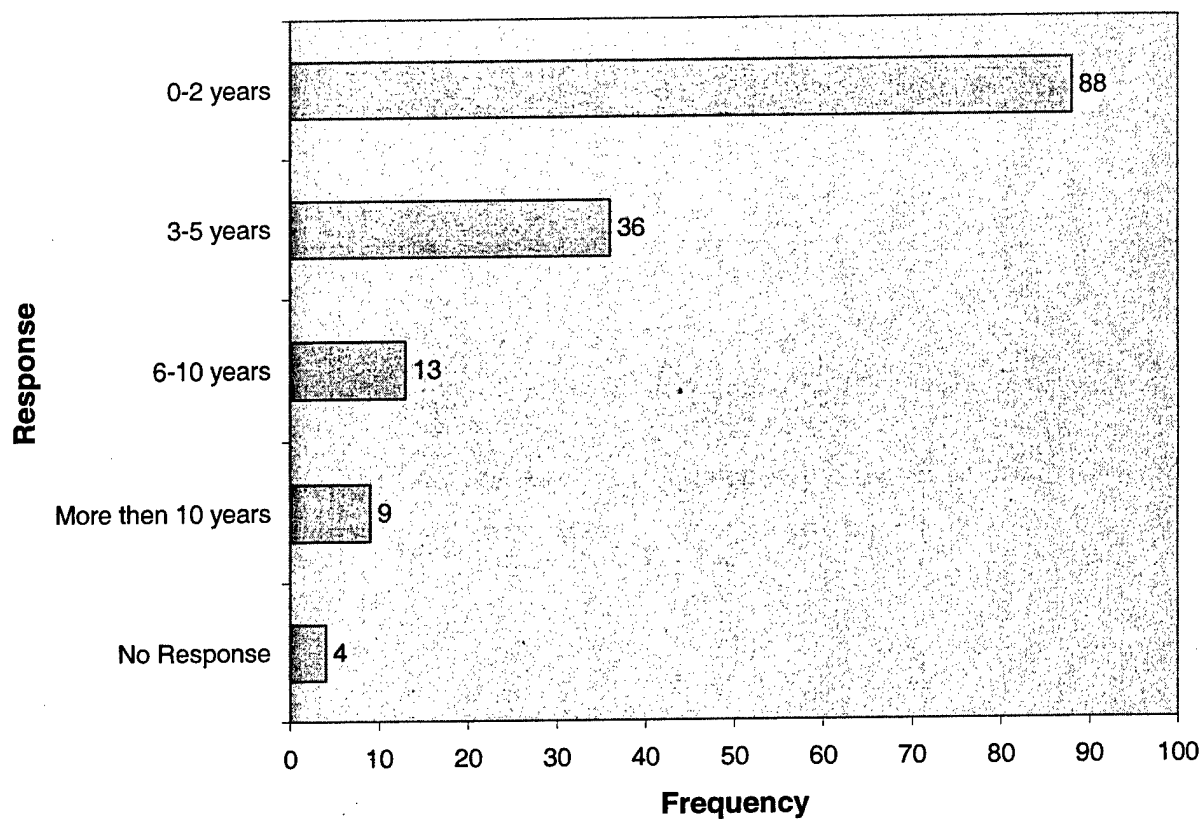
Figure 5: Years of experience working as an Army acquisition manager



Summary	Total number	150
	More than 10 years	59%
	6-10 years	20%
	3-5 years	11%
	0-2 years	7%
	No Response	3%

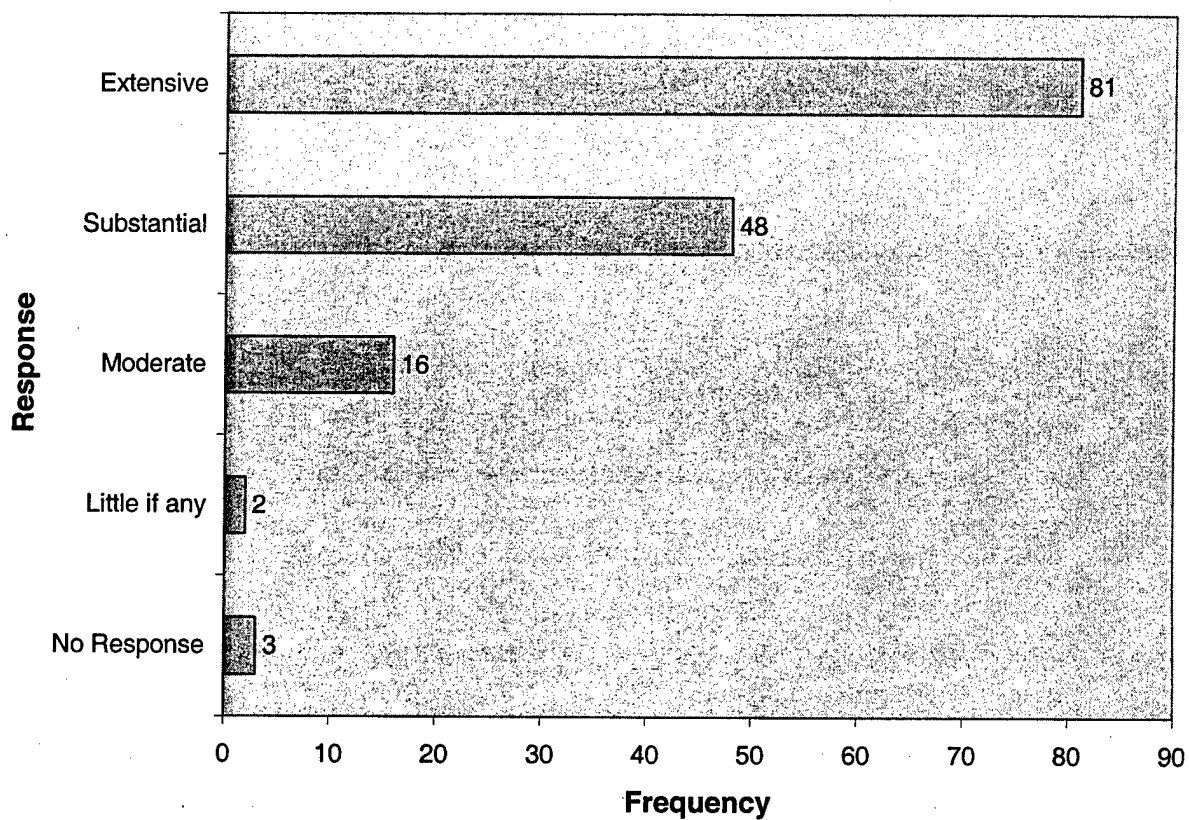
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Figure 6: Years of experience in current position



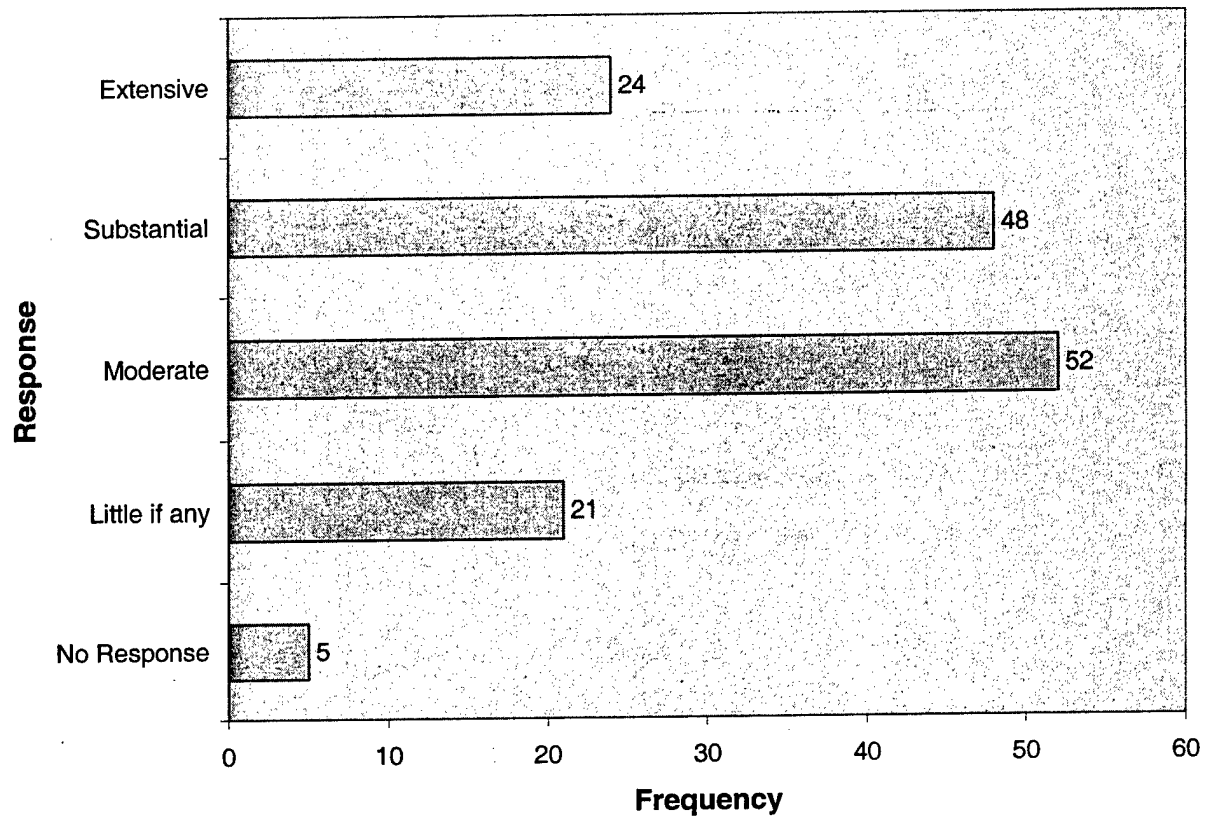
Summary	Total number	150
	More than 10 years	6%
	6-10 years	9%
	3-5 years	24%
	0-2 years	59%
	No Response	3%

Figure 7: Self-reported level of expertise in acquisition program/project management



Summary	Total number	150
	Extensive	54%
	Substantial	32%
	Moderate	11%
	Little if any	1%
	No Response	2%

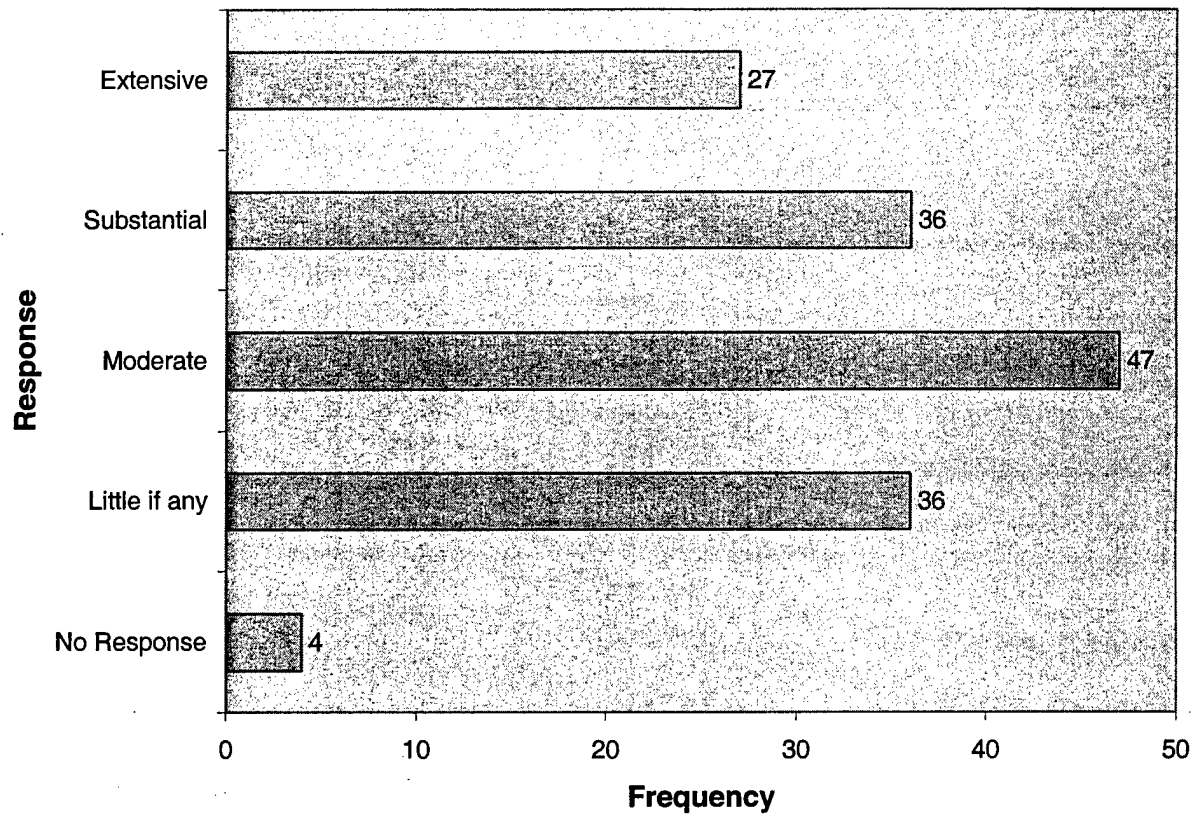
Figure 8: Self-reported level of expertise in software acquisition management



Summary

Total number	150
Extensive	16%
Substantial	32%
Moderate	35%
Little if any	14%
No Response	3%

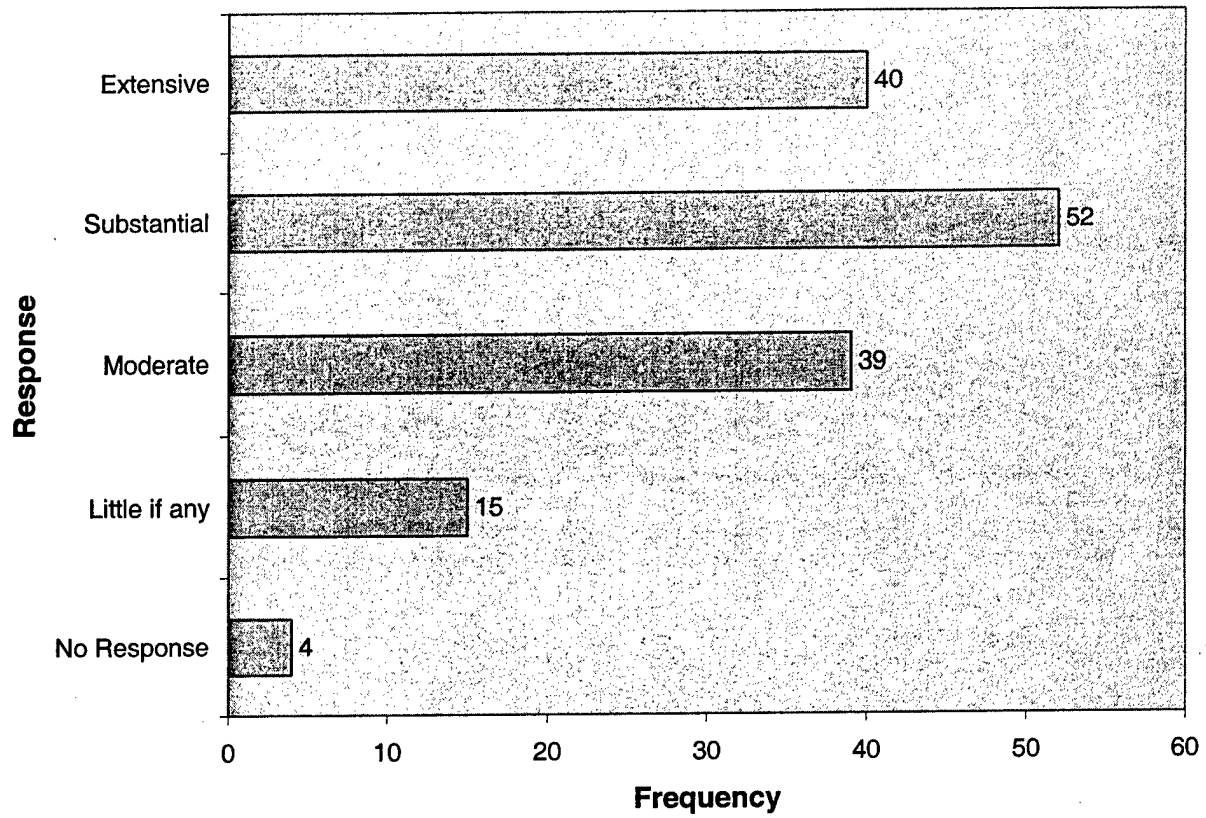
Figure 9: Self-reported level of expertise in software engineering technical practices



Summary

Total number	150
Extensive	18%
Substantial	24%
Moderate	31%
Little if any	24%
No Response	3%

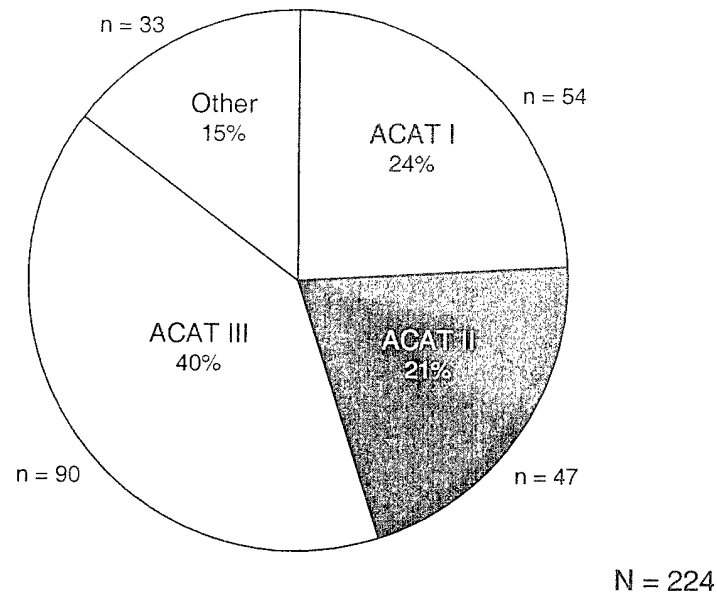
Figure 10: Self-reported level of expertise in systems engineering



Summary

Total number	150
Extensive	27%
Substantial	35%
Moderate	26%
Little if any	10%
No Response	3%

Figure 11: Respondent's responsibility for ACAT Programs



Explanation of diagram

The 150 individuals that responded to this survey identified the ACAT level of the programs that they are responsible for.

Since the total number of programs identified is 224, it is obvious that some managers are responsible for multiple programs (and these are a mixture of ACAT levels).

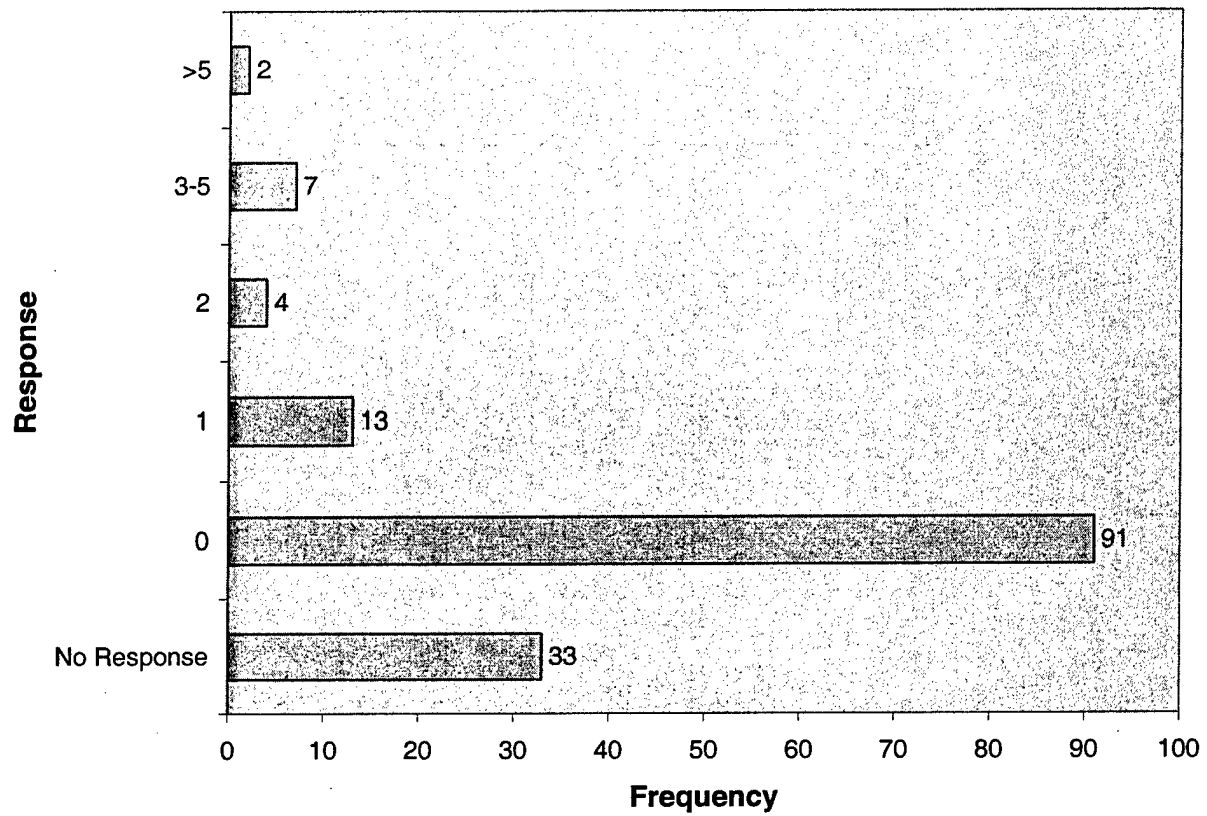
Type of systems being acquired

Respondents were asked to describe the type of system(s) and how many of each type that they are responsible for. This table summarizes the figures that are presented on the upcoming pages.

Fig.	Type of system	Description
12	Automated Information Systems	Management information systems supporting business operations such as payroll, inventory, or logistics
13	Weapons Systems	Systems with real-time process control or guidance systems for avionics or radar; embedded software running in electronic devices, vehicles, missiles or aircraft
14	C ³ IEW or C4ISR	Decision support systems, intelligence systems, mission planning, communications systems, or maneuver control
15	Other	Modeling and simulation, compilers, configuration management tools, cost estimation tools, personal computer applications, pattern recognition

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Figure 12: Automated Information Systems per Respondent



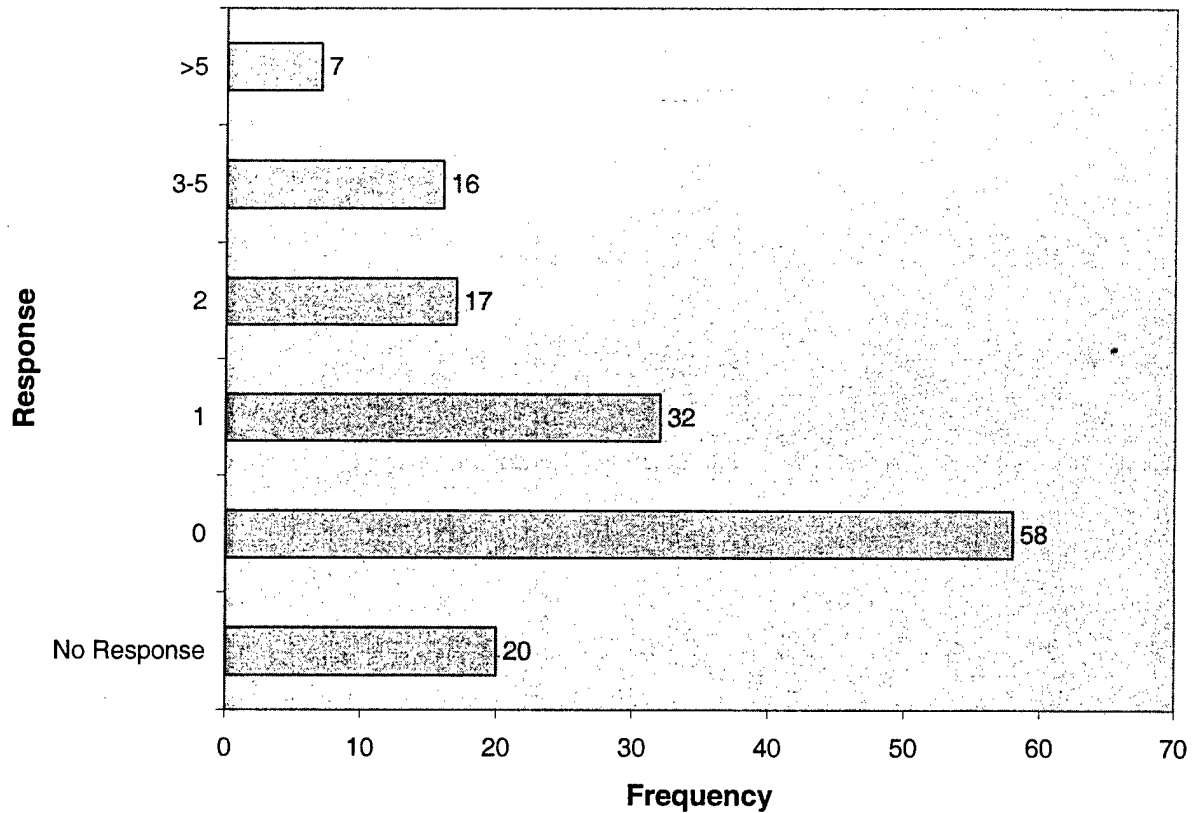
Summary

Total number	150
>5	1%
3-5	5%
2	3%
1	9%
0	61%
No Response	22%

Note

The term "automated information systems" refers to management information systems supporting business operations such as payroll, inventory, or logistics.

Figure 13: Number of Weapons Systems per Respondent



Summary

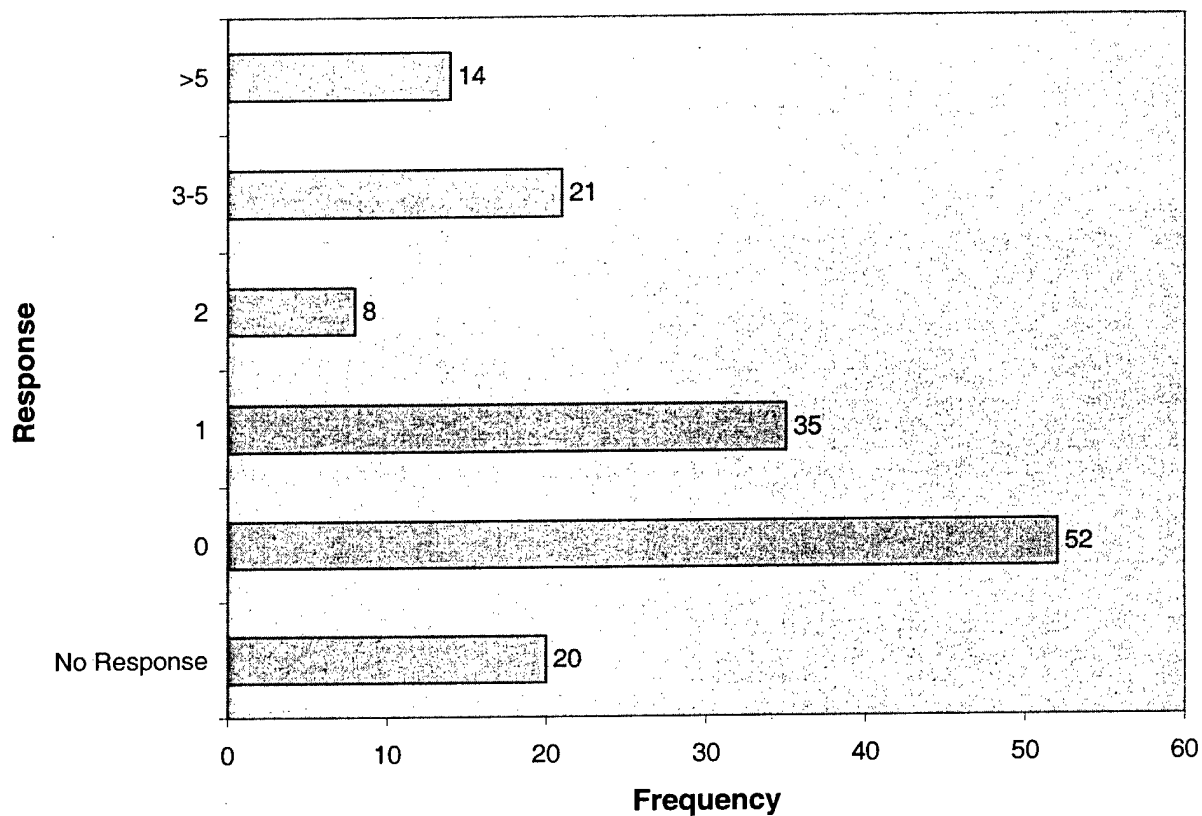
Total number	150
>5	5%
3-5	11%
2	11%
1	21%
0	39%
No Response	13%

Note

The term "weapons systems" refers to systems with real-time process control or guidance systems for avionics or radar; embedded software running in electronic devices, vehicles, missiles or aircraft.

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Figure 14: Number of C³IEW or C4ISR per Respondent



Summary

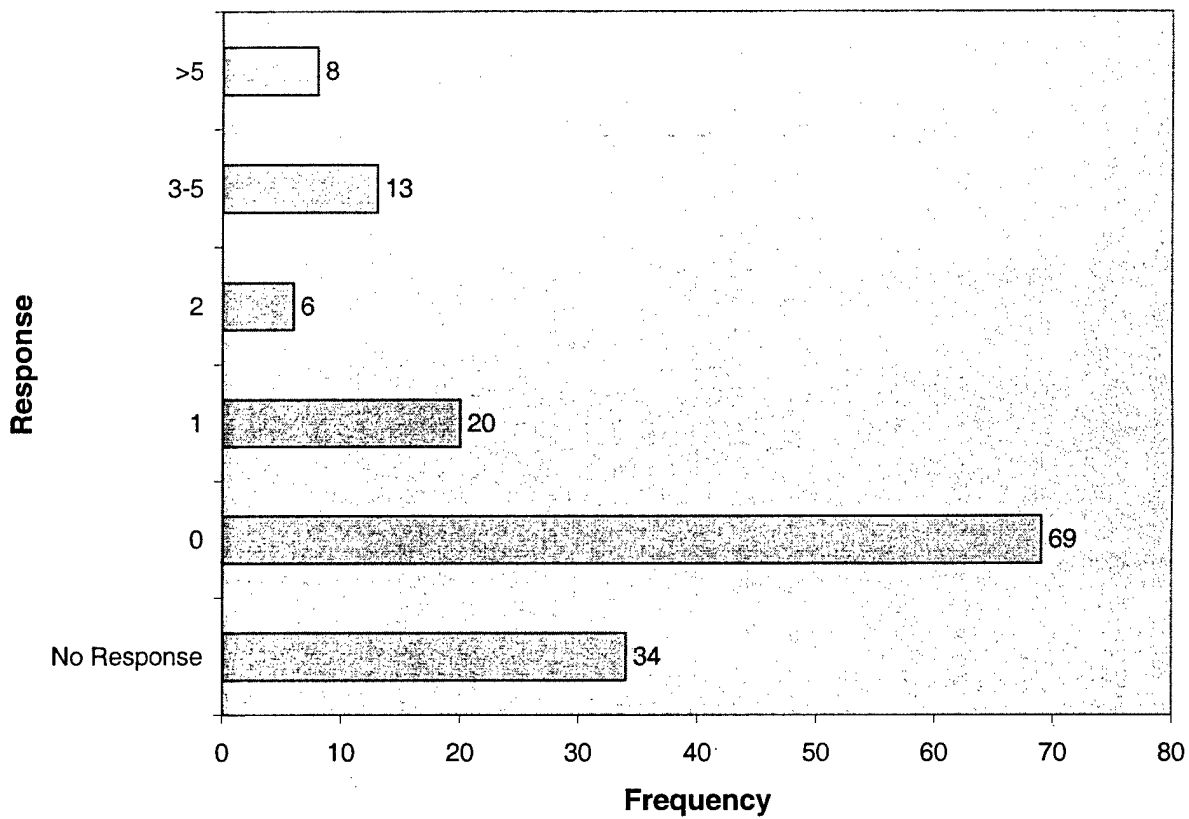
Total number	150
>5	9%
3-5	14%
2	5%
1	23%
0	35%
No Response	13%

Note

The term "C³IEW or C4ISR" refers to decision support systems, intelligence systems, mission planning, communications systems, or maneuver control.

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Figure 15: Number of Other Systems per Respondent



Total number	150
>5	5%
3-5	9%
2	4%
1	13%
0	46%
No Response	23%

Note

The term "Other" refers to such systems as modeling and simulation, compilers, configuration management tools, cost estimation tools, personal computer applications, pattern recognition.

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7 Overview of Survey Results

Introduction

In this chapter, the survey results are presented in graphical format supported by tabular information.

The results are not commented on in this chapter. For key observations and interpretations, see chapter 8, Observations and Conclusions on page 103.

Result categories

This chapter contains the following categories of results.

Results	See Page
The acquirer environment and communication	32
The developer environment	84
Impact of external factors on acquisition	112
Where are the major problems and risks?	113
What are the most difficult problems?	115

7.1 Relevancy of Current DoD Acquisition-Based Initiatives

Background

The DoD has implemented the major acquisition-based initiatives identified below:

- Performance-Based Payments
- Price-based Acquisition
- Performance-Based Services Acquisition
- Interoperability
- Cost as an Independent Variable
- Electronic Business
- Knowledge Management in the Acquisition Workforce
- Past Performance
- Performance Specifications
- FAR Part 12 / Commercial Item Procurements
- Total Ownership Cost Management
- ISO 9001: 2000 Quality Management Systems
- Open Systems Design
- Integrated Digital Environment
- Logistics Transformation
- Contractor Incentives Guide
- Reducing Government Property in Possession of Contractors
- Intellectual Property Guidelines

Respondents were asked to indicate their perception of the relevance of these initiatives to how they perform their work.

Scaling the results

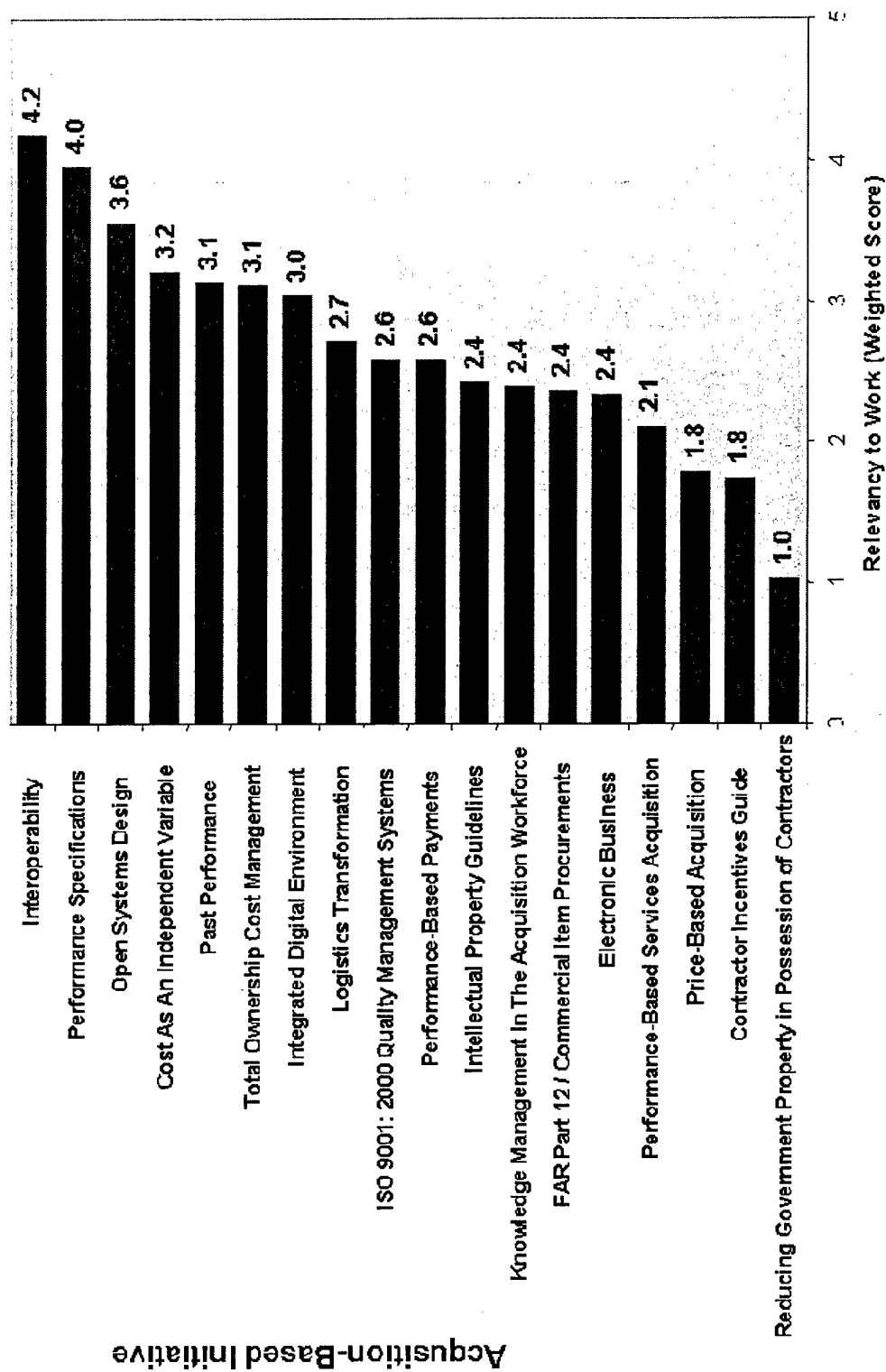
To summarize the results, we applied the following numerical scale to the available response categories:

Response category	Score
Highly relevant	5
Relevant	3
Somewhat relevant	1
Not relevant or don't know	0

The response totals were summed for each initiative, then divided by the number of respondents to normalize the assigned score.

The results appear on the next page in Figure 16.

Figure 16: Respondent perception of relevancy of current DoD acquisition-based initiatives

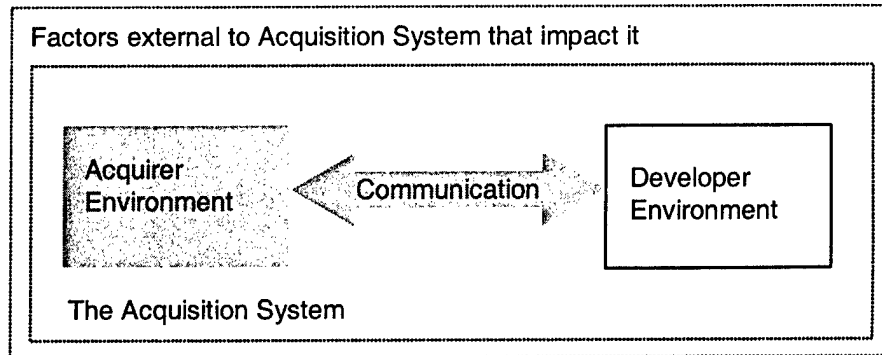


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7.2 The Acquirer Environment & Communication - Overview

Context diagram

One section of the survey focused on the acquirer environment and the communication between acquirer and developer (shaded areas in diagram below). This section describes the results for these topic areas.



General format of questions

In general, the questionnaire items for this section were close-ended with possible response categories as follows:

- Strongly Agree
- Agree
- Disagree
- Strongly Disagree
- Don't Know or Not Applicable

In this section

Questions focused on the following topical categories listed in this table.

Topic Area	See Page
Education and training	33
Software acquisition planning and project management	39
Use of measurement to support decision making	49
Solicitation	57
Software-related contractual requirements development and management	63
Contract performance management	69
Transition-to-support	74
Transition-to-operations	79

For each topic area

For each topic area listed in the table above, a summary of the results are first presented, followed by charts that present additional detail. The summary shows the combined "Strongly Agree" and "Agree" tallies for each

question.

In general, a response showing agreement suggests that an effective practice is in use by the respondent's organization.

7.2.1 Education and Training

Synopsis

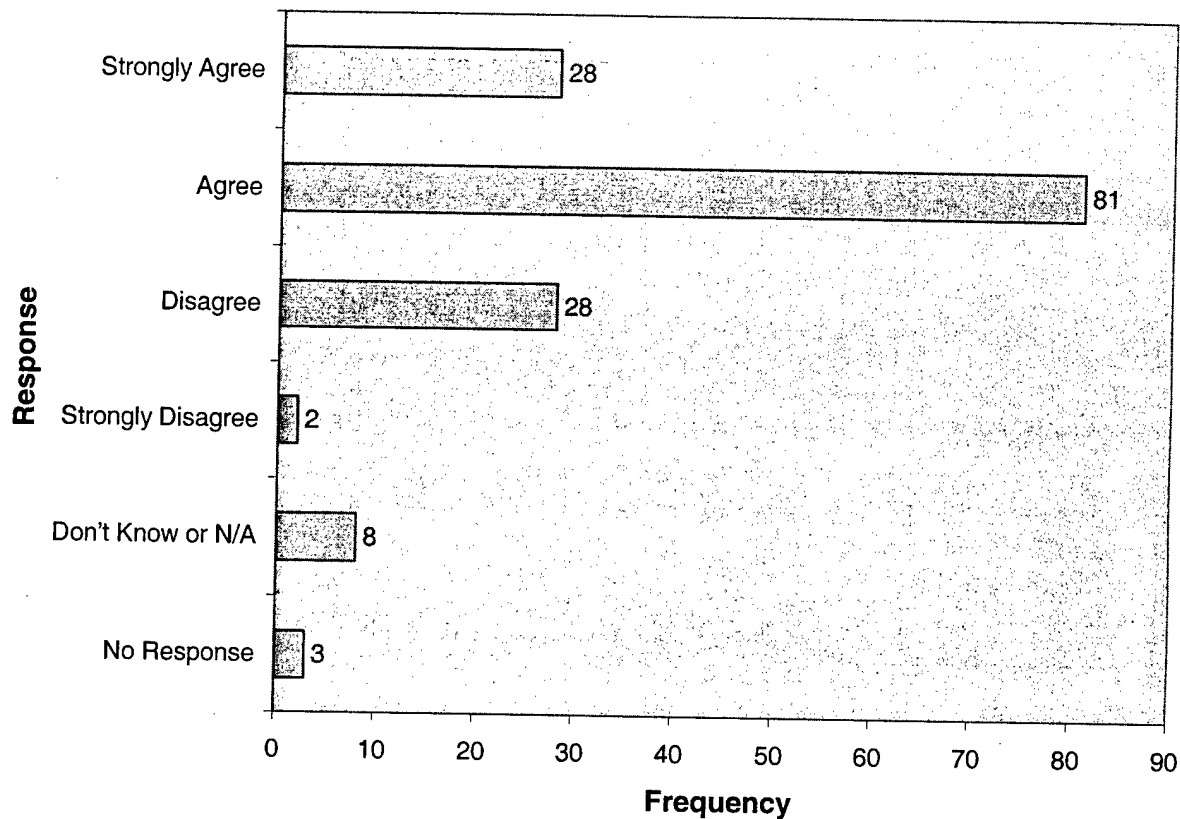
This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
Training that is required for the project teams to achieve their software acquisition objectives is identified and provided.	73
You know who to contact when you have training needs from the organization.	88
There are mechanisms in place that allow you to provide feedback with regard to the effectiveness of training.	73
You use organizational or project training plans to plan for individual training.	59
In general, you feel there are ample training opportunities available to ensure that project staff have the right skills to perform their jobs.	83

Detailed response profiles

The detailed response profiles are presented on the following pages.

Figure 17: Training that is required for the project teams to achieve their software acquisition objectives is identified and provided.

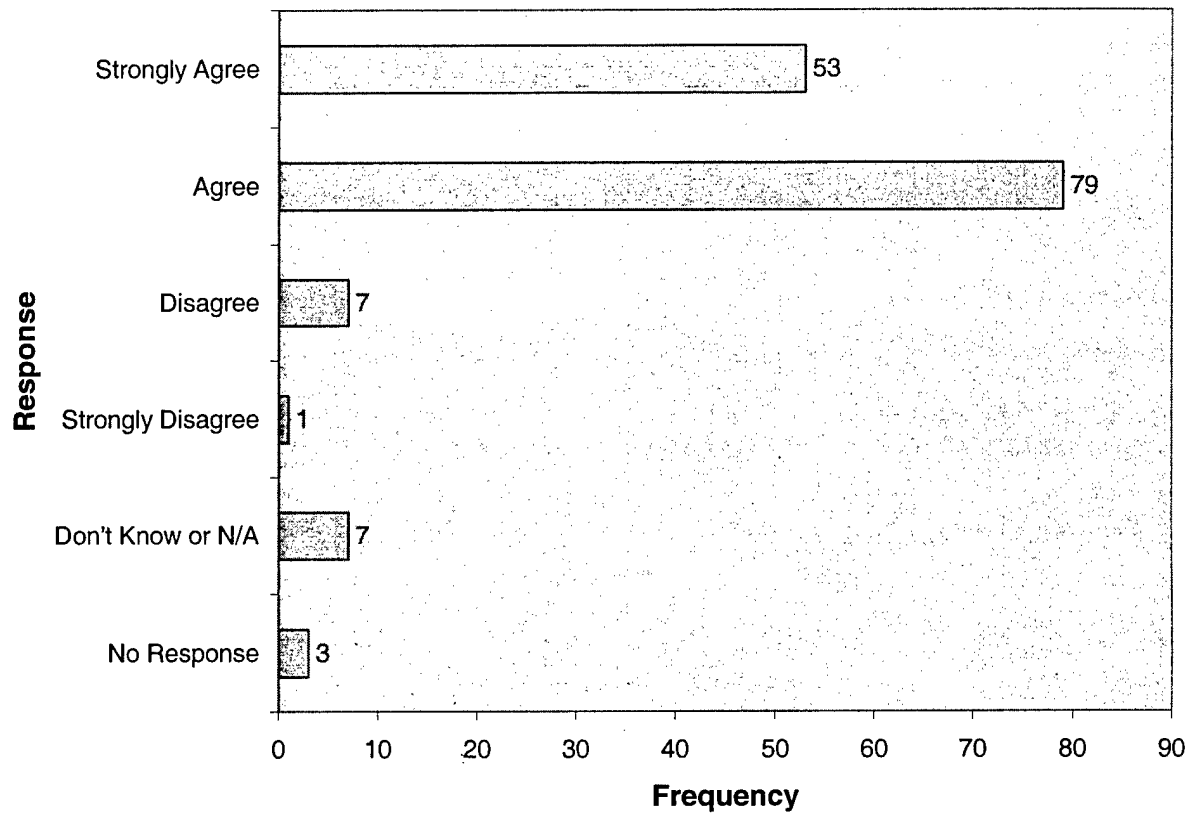


Summary

Total number	150
Strongly Agree and Agree	73%
Strongly Disagree and Disagree	20%
Don't Know or N/A	5%

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Figure 18: You know who to contact when you have training needs from the organization.

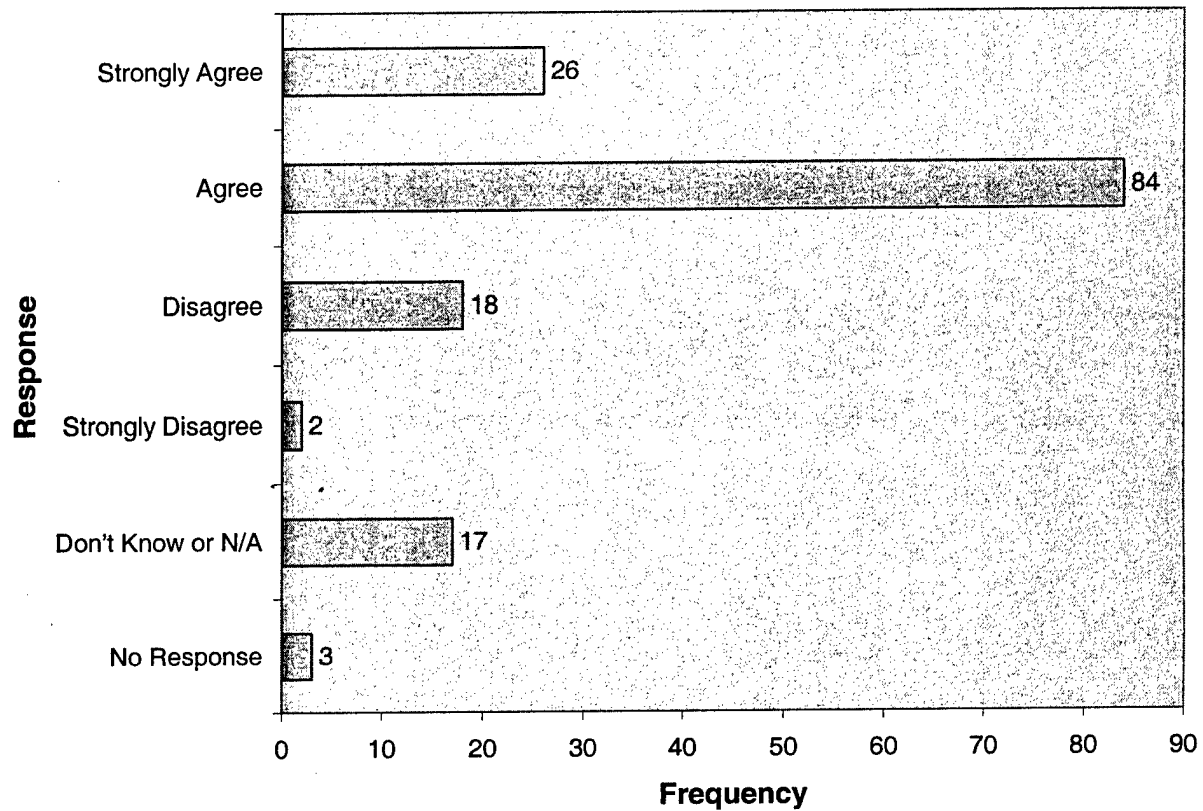


Summary

Total number	150
Strongly Agree and Agree	88%
Strongly Disagree and Disagree	5%
Don't Know or N/A	5%

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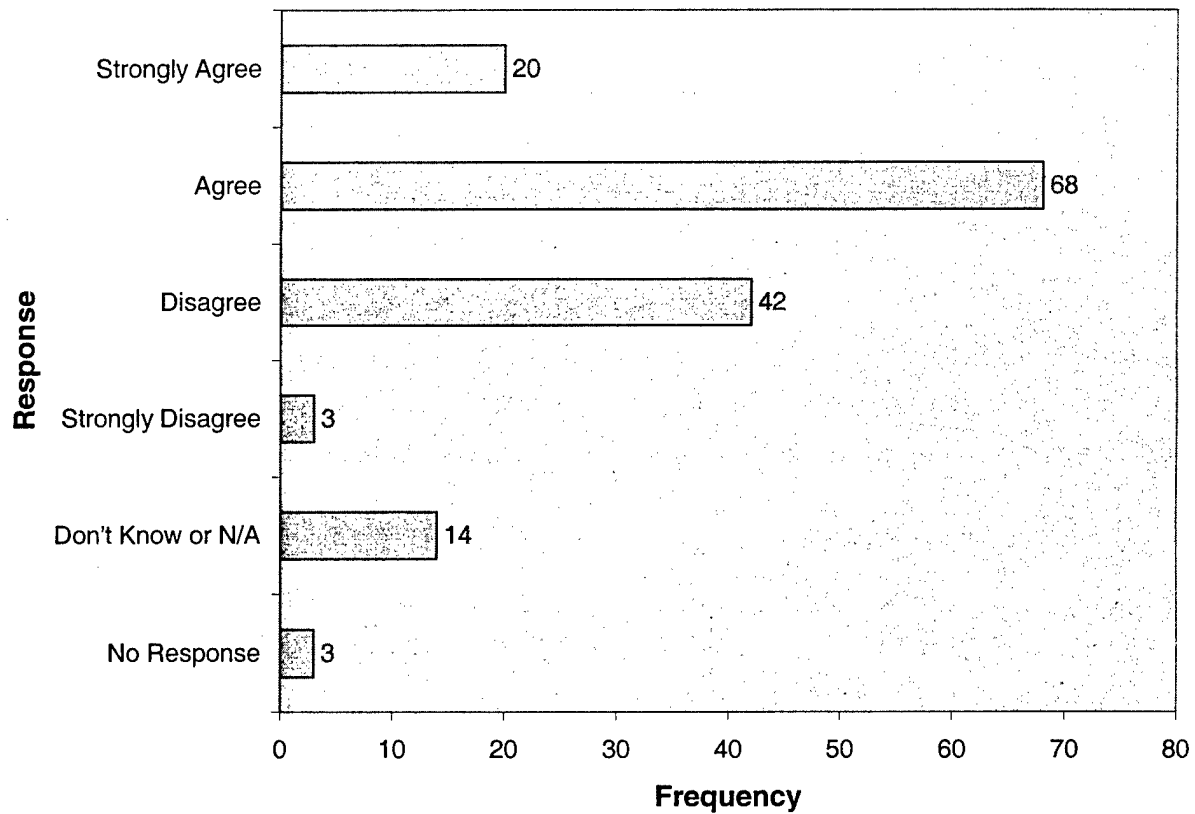
Figure 19: There are mechanisms in place that allow you to provide feedback with regard to the effectiveness of training.



Summary

Total number	150
Strongly Agree and Agree	73%
Strongly Disagree and Disagree	13%
Don't Know or N/A	11%

Figure 20: You use organizational or project training plans to plan for individual training.

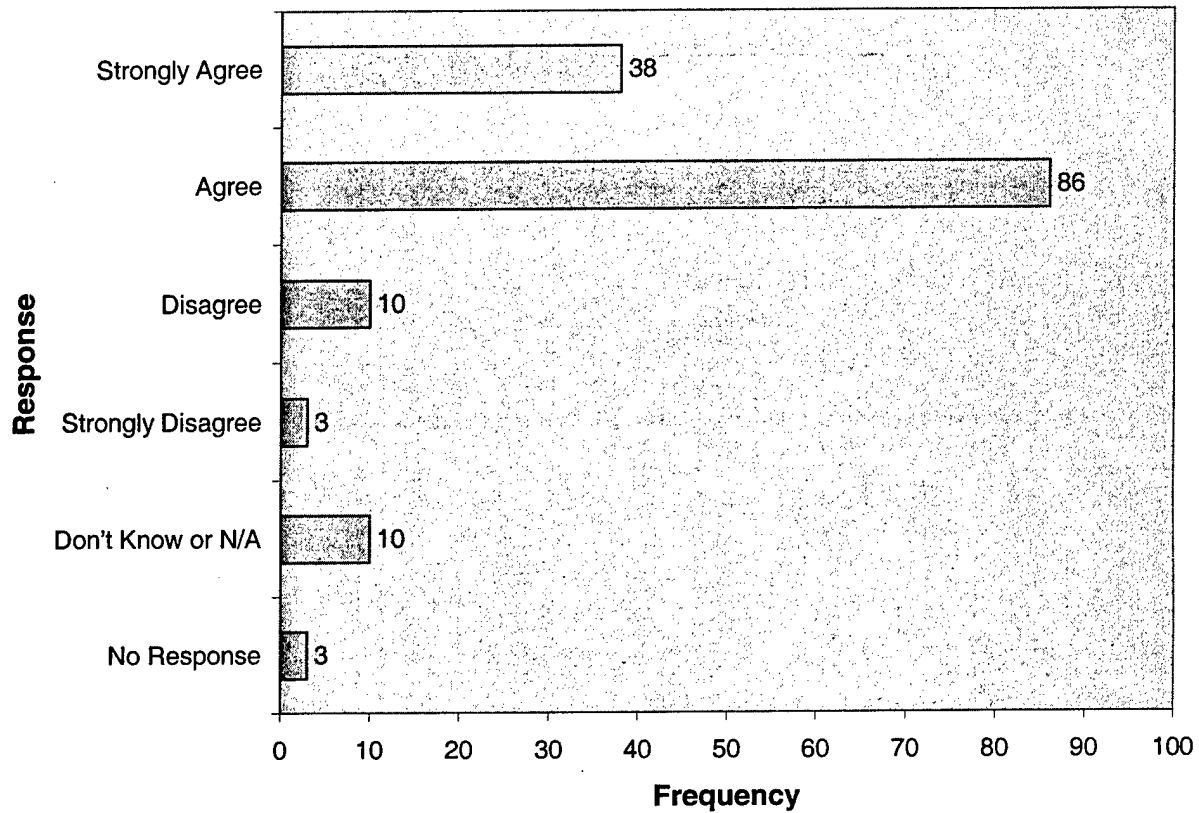


SUMMARY

Total number	150
Strongly Agree and Agree	59%
Strongly Disagree and Disagree	30%
Don't Know or N/A	9%

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Figure 21: In general, you feel there are ample training opportunities available to ensure that project staff have the right skills to perform their jobs.



Summary

Total number	150
Strongly Agree and Agree	83%
Strongly Disagree and Disagree	9%
Don't Know or N/A	7%

7.2.2 Software Acquisition Planning and Project Management

Synopsis

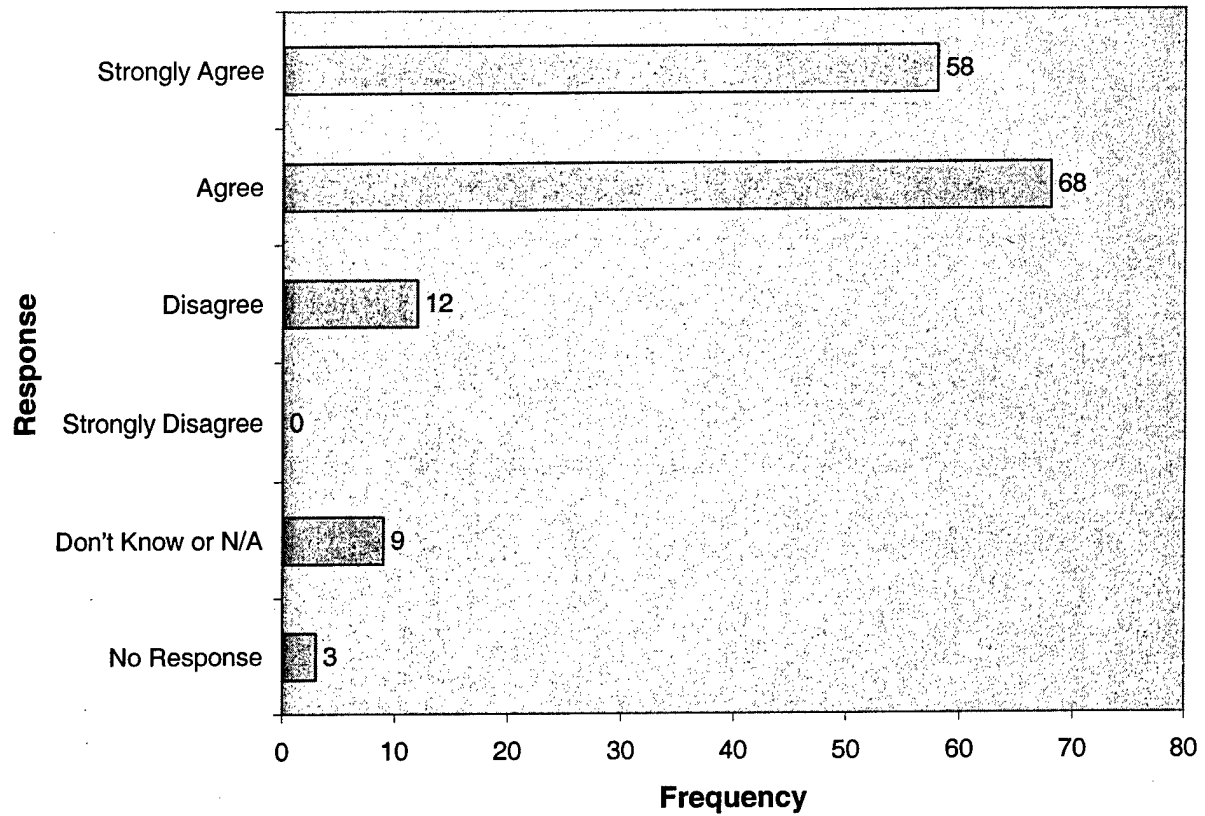
This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
Software experts participate in system acquisition planning.	84
Acquisition plans are revised when major changes occur.	87
Project-wide participation in the identification and mitigation of risks is encouraged and valued by management.	85
Your acquisition project assesses the likelihood and consequence of each risk and monitors the status of each risk item.	85
A novice engineer (participating on this acquisition project) would know how to surface risks according to the risk identification and analysis plan.	59
Weekly or biweekly status checks or other periodic reviews are held to manage and control risks, issues, and problems discovered during the software acquisition.	81
If a novice engineer discovers a problem or risk in the system design, I am confident that they would know what to do to surface that issue.	75
There is a well-understood and effective process for resolving issues among all project functions.	76
There is a change request process for submitting suggestions for improving the acquisition process.	56

Detailed response profiles

The detailed response profiles are presented on the following pages.

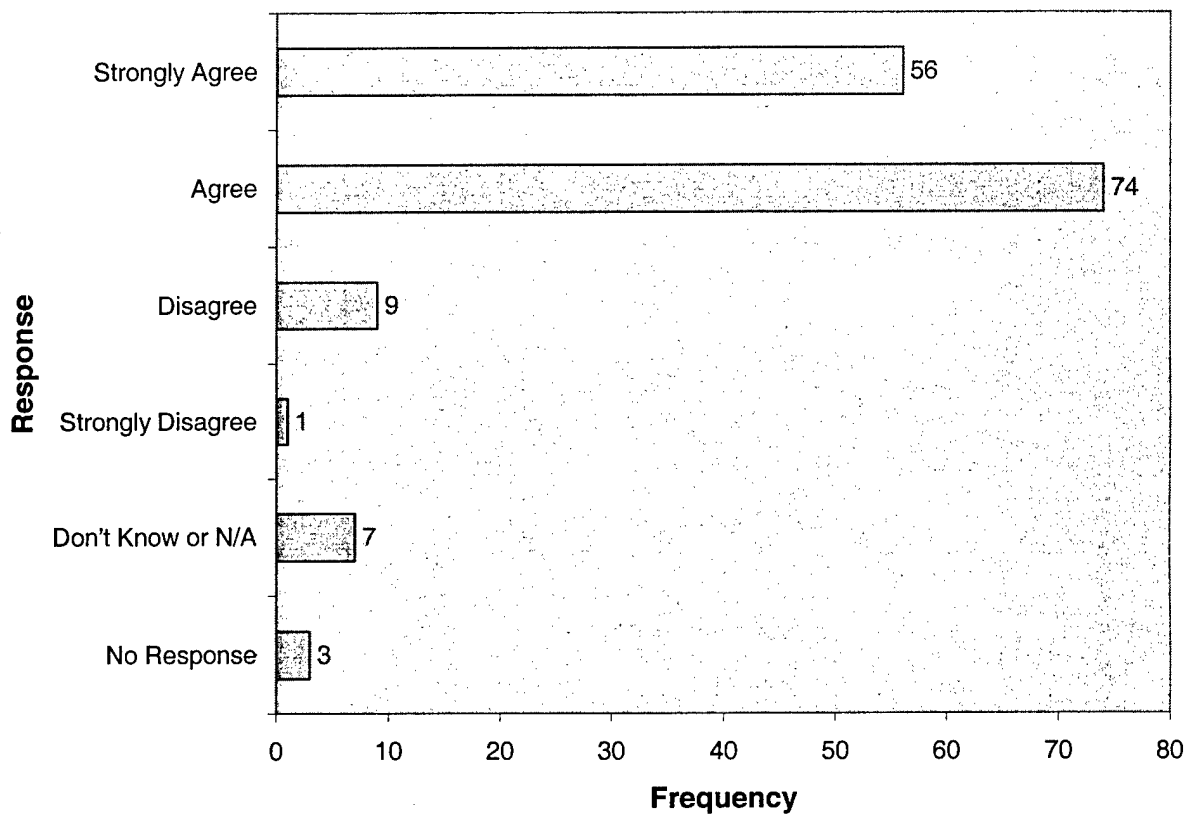
Figure 22: Software experts participate in system acquisition planning.



Summary

Total number	150
Strongly Agree and Agree	84%
Strongly Disagree and Disagree	8%
Don't Know or N/A	6%

Figure 23: Acquisition plans are revised when major changes occur.

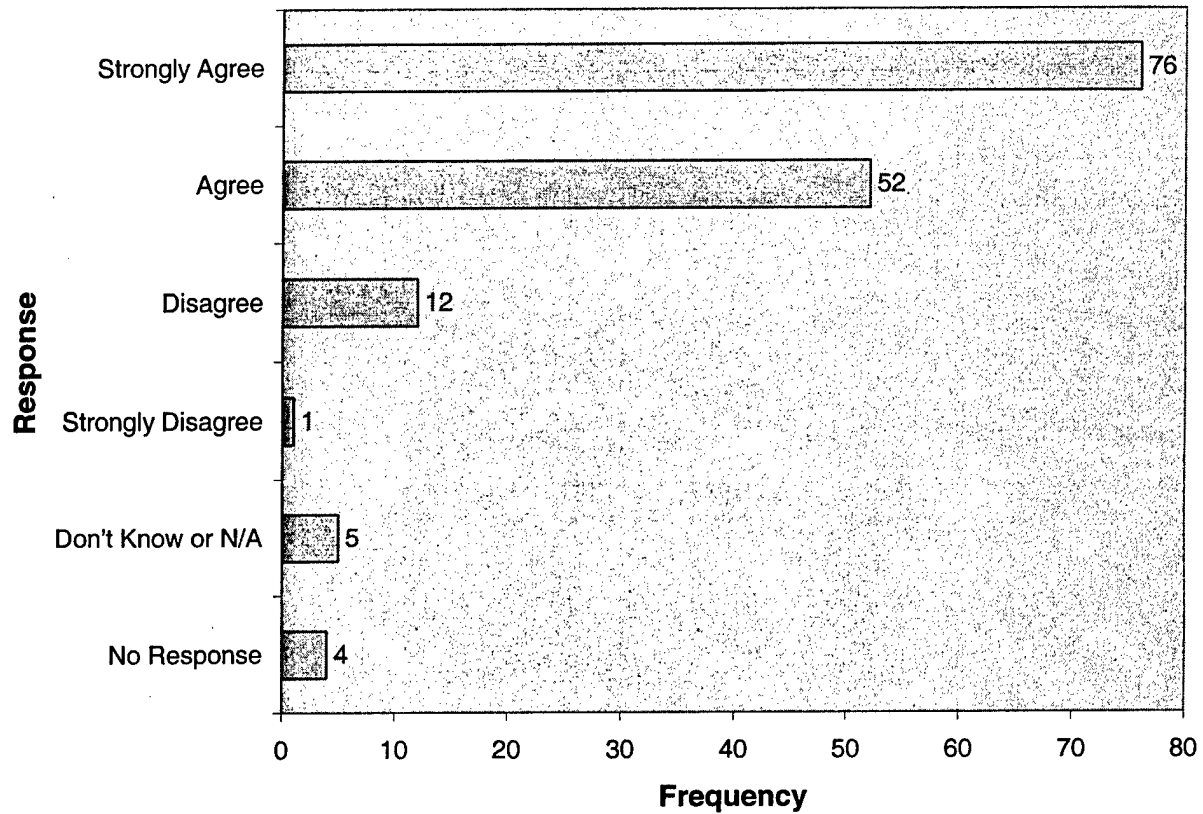


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Total number	150
Strongly Agree and Agree	87%
Strongly Disagree and Disagree	7%
Don't Know or N/A	5%

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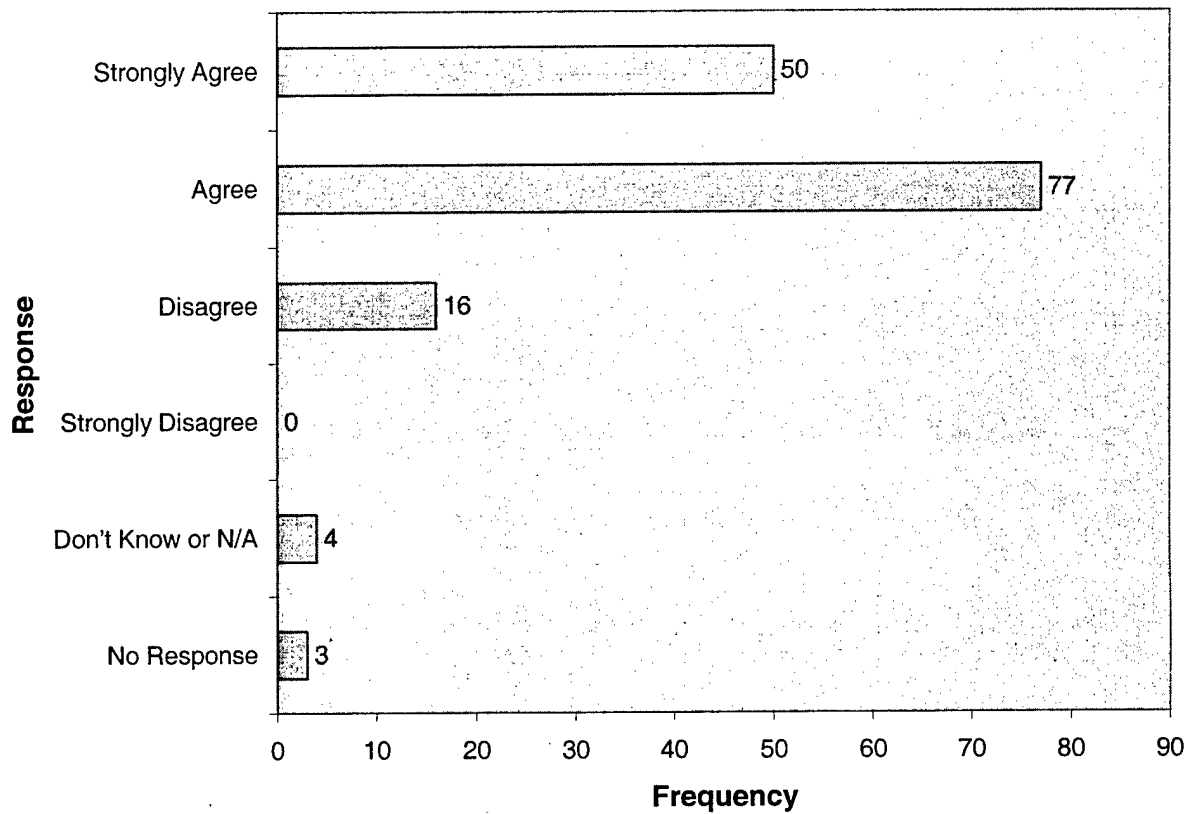
Figure 24: Project-wide participation in the identification and mitigation of risks is encouraged and valued by management.



Summary

Total number	150
Strongly Agree and Agree	85%
Strongly Disagree and Disagree	9%
Don't Know or N/A	3%

Figure 25: Your acquisition project assesses the likelihood and consequence of each risk and monitors the status of each risk item.

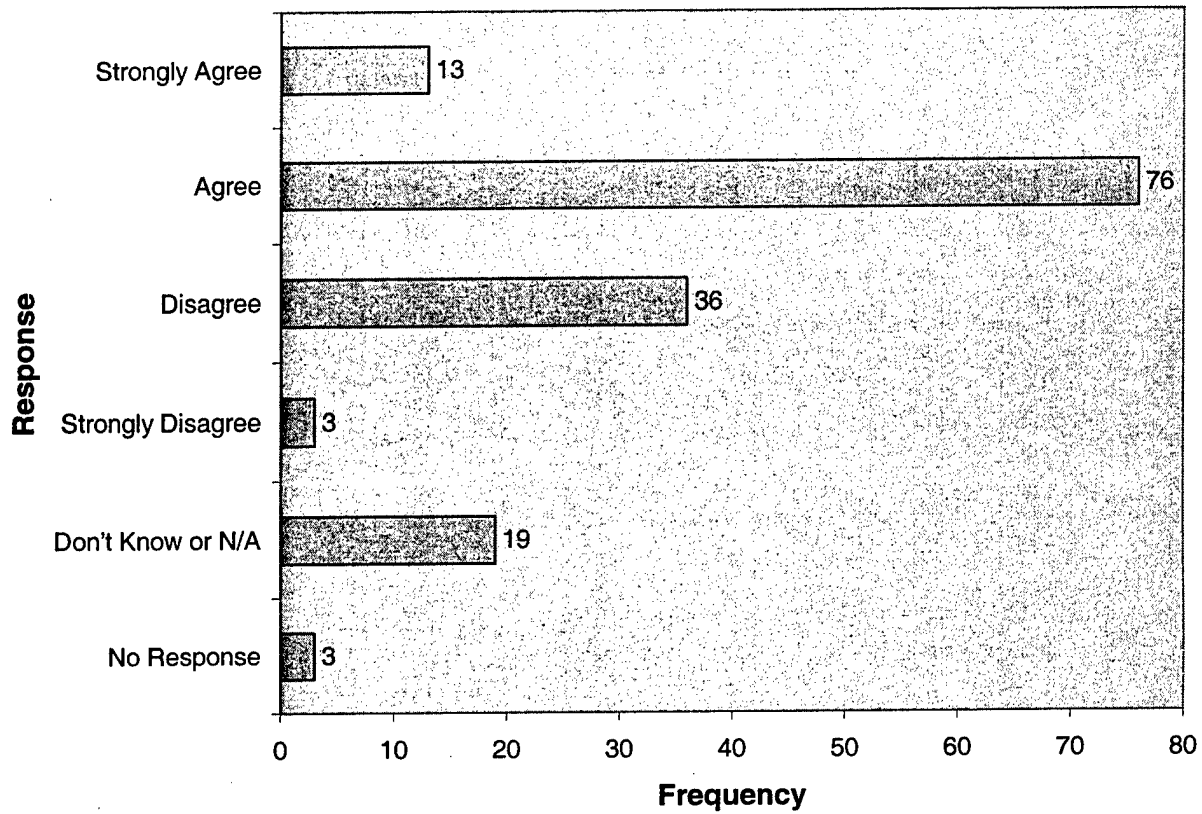


Summary

Total number	150
Strongly Agree and Agree	85%
Strongly Disagree and Disagree	11%
Don't Know or N/A	3%

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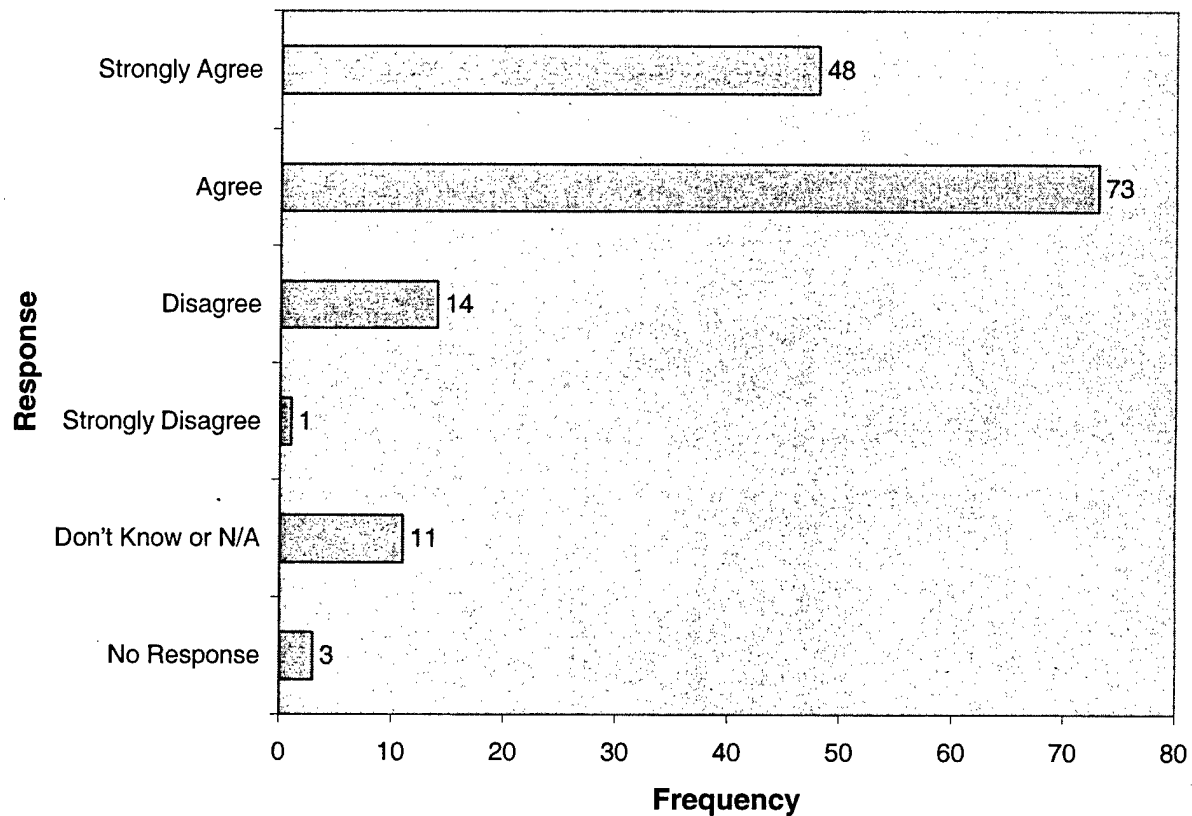
Figure 26: A novice engineer (participating on this acquisition project) would know how to surface risks according to the risk identification and analysis plan.



Summary

Total number	150
Strongly Agree and Agree	59%
Strongly Disagree and Disagree	26%
Don't Know or N/A	13%

Figure 27: Weekly or biweekly status checks or other periodic reviews are held to manage and control risks, issues, and problems discovered during the software acquisition.

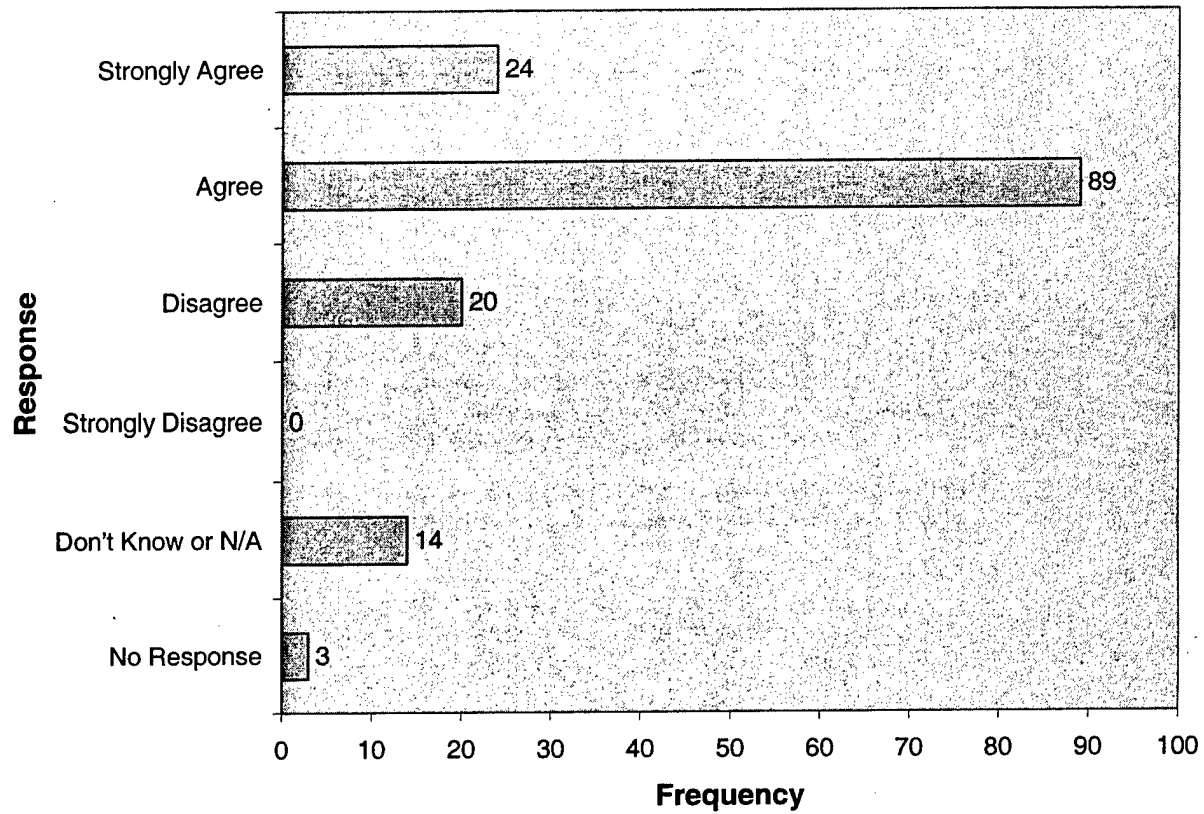


SUMMARY

Total number	150
Strongly Agree and Agree	81%
Strongly Disagree and Disagree	10%
Don't Know or N/A	7%

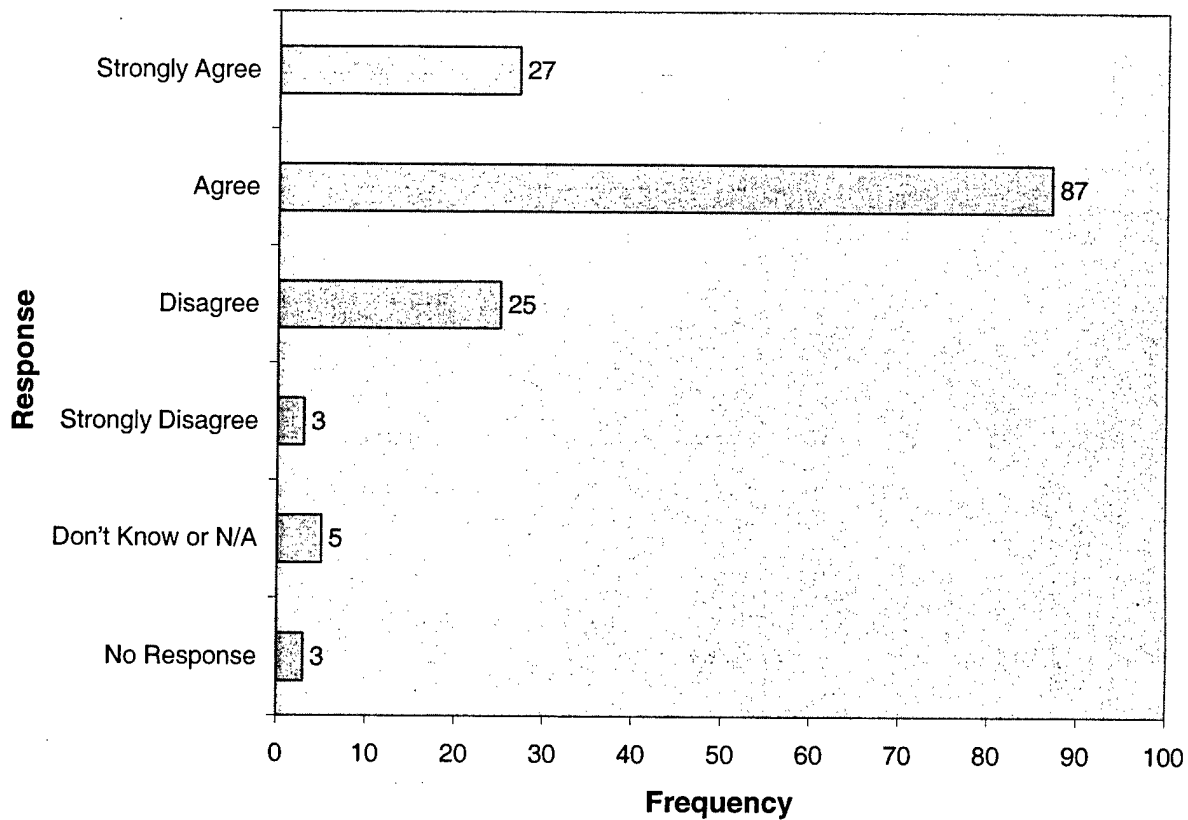
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Figure 28: If a novice engineer discovers a problem or risk in the system design, I am confident that they would know what to do to surface that issue.



Summary	Total number	150
	Strongly Agree and Agree	75%
	Strongly Disagree and Disagree	13%
	Don't Know or N/A	9%

Figure 29: There is a well-understood and effective process for resolving issues among all project functions.

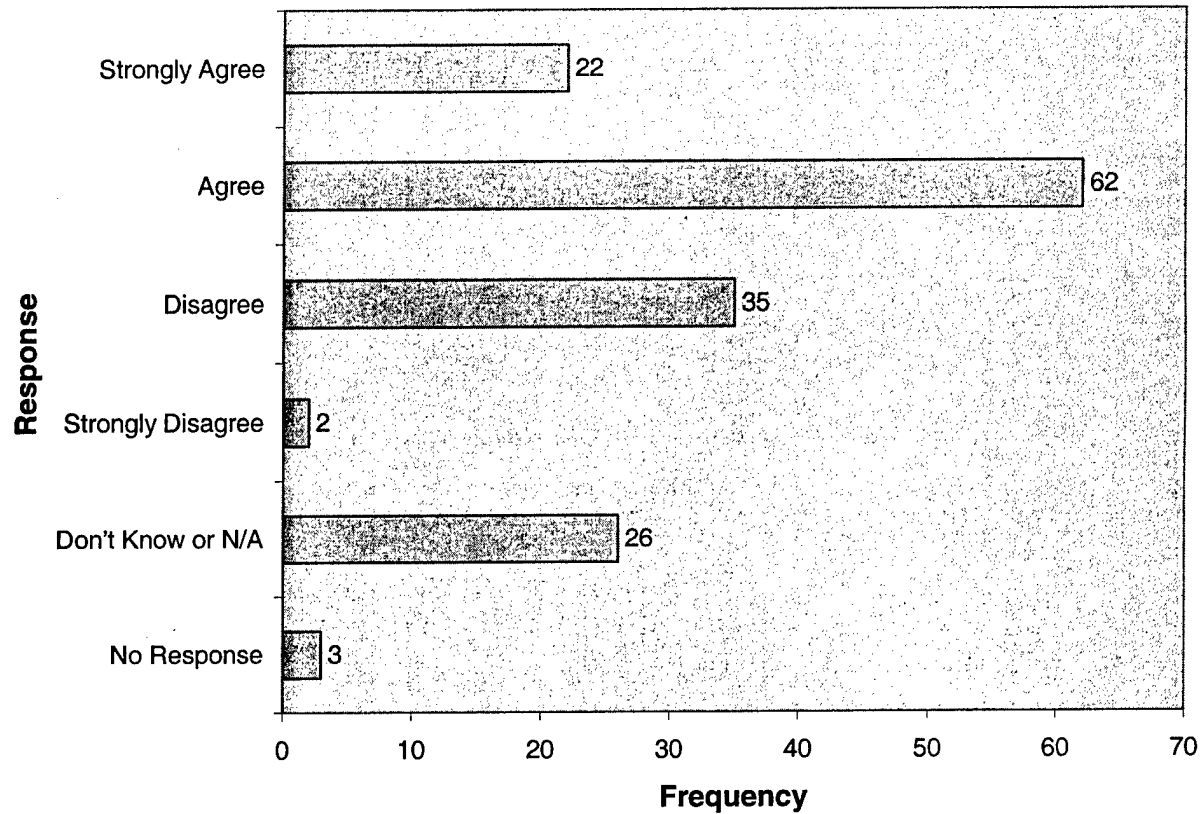


Summary

Total number	150
Strongly Agree and Agree	76%
Strongly Disagree and Disagree	19%
Don't Know or N/A	3%

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Figure 30: There is a change request process for submitting suggestions for improving the acquisition process.



Summary

Total number	150
Strongly Agree and Agree	56%
Strongly Disagree and Disagree	25%
Don't Know or N/A	17%

7.2.3 Use of Measurement to Support Decision Making

Synopsis

This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
Planning estimates are based on historical measurement data from previous acquisition projects.	83
Measurement-based objectives for the acquired products and services are defined.	79
The acquisition project uses metrics as an input to program decision making.	81
The performance, cost, and schedule objectives of the software acquisition project are measured and controlled throughout the software acquisition	75
Your project team uses measures and analytic techniques for statistically managing selected processes and sub-processes.	67
Your project team records statistical and quality management data in the organization's measurement repository and uses that information for decision making.	50

Metrics used

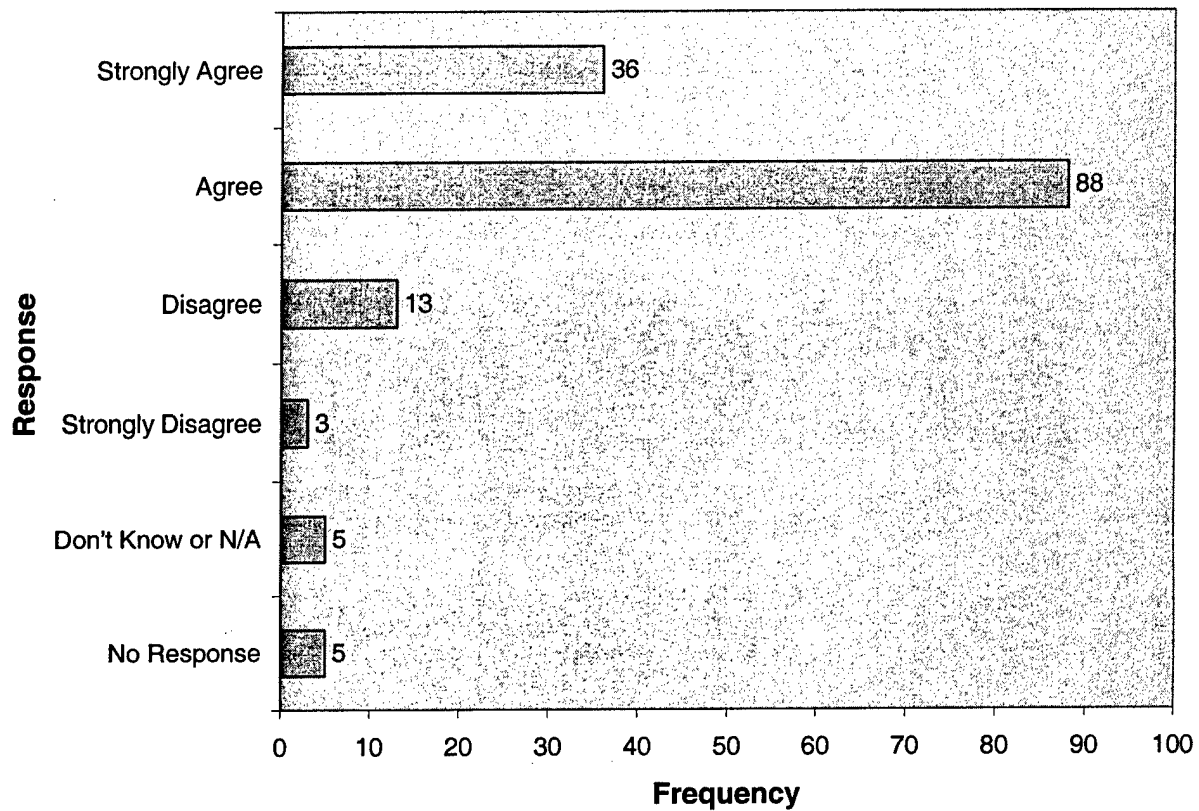
Respondents were also asked to identify the types of measures used to track project status. Below is a summary of these results. A detailed chart of this information is provided in Figure 37 on page 56.

Measure	Percent using
Requirements stability	51
Manpower	63
Development progress	82
Cost	86
Schedule	91

Detailed response profiles

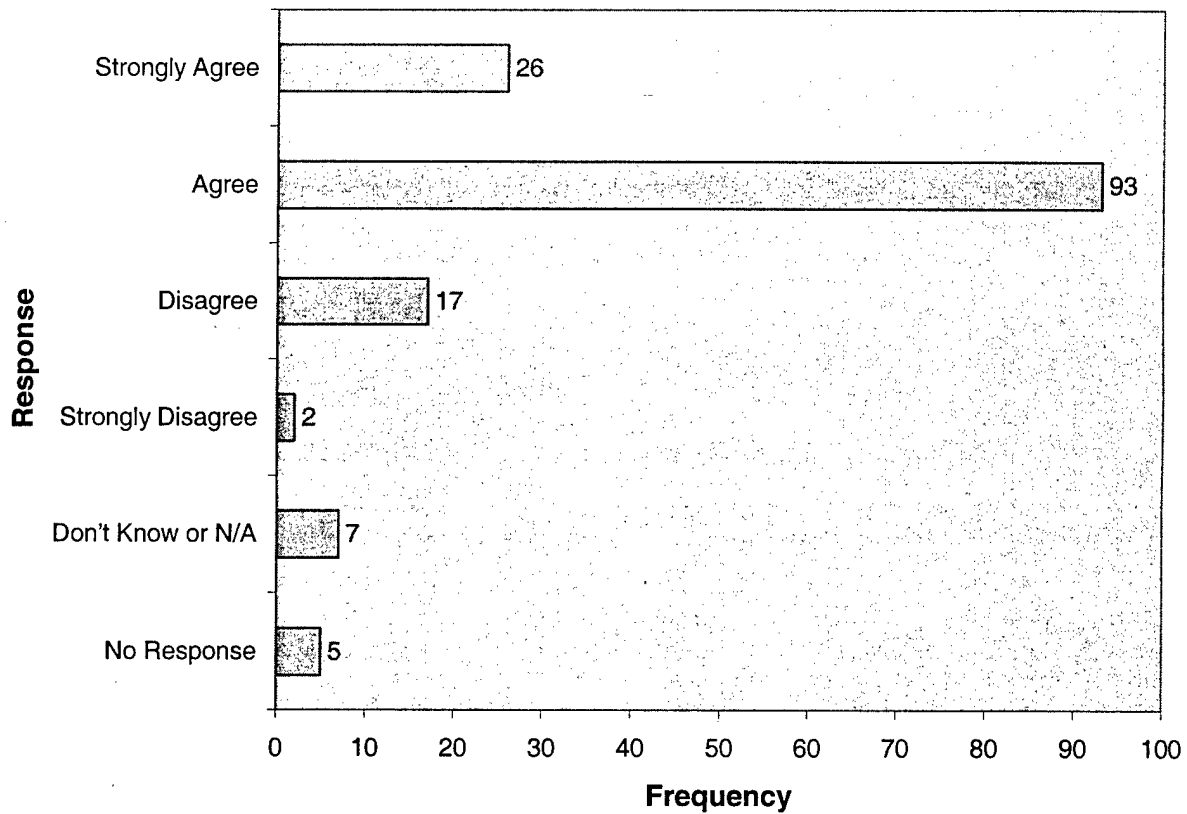
The detailed response profiles are presented on the following pages.

Figure 31: Planning estimates are based on historical measurement data from previous acquisition projects.



Summary	Total number	150
	Strongly Agree and Agree	83%
	Strongly Disagree and Disagree	11%
	Don't Know or N/A	3%

Figure 32: Measurement-based objectives for the acquired products and services are defined.

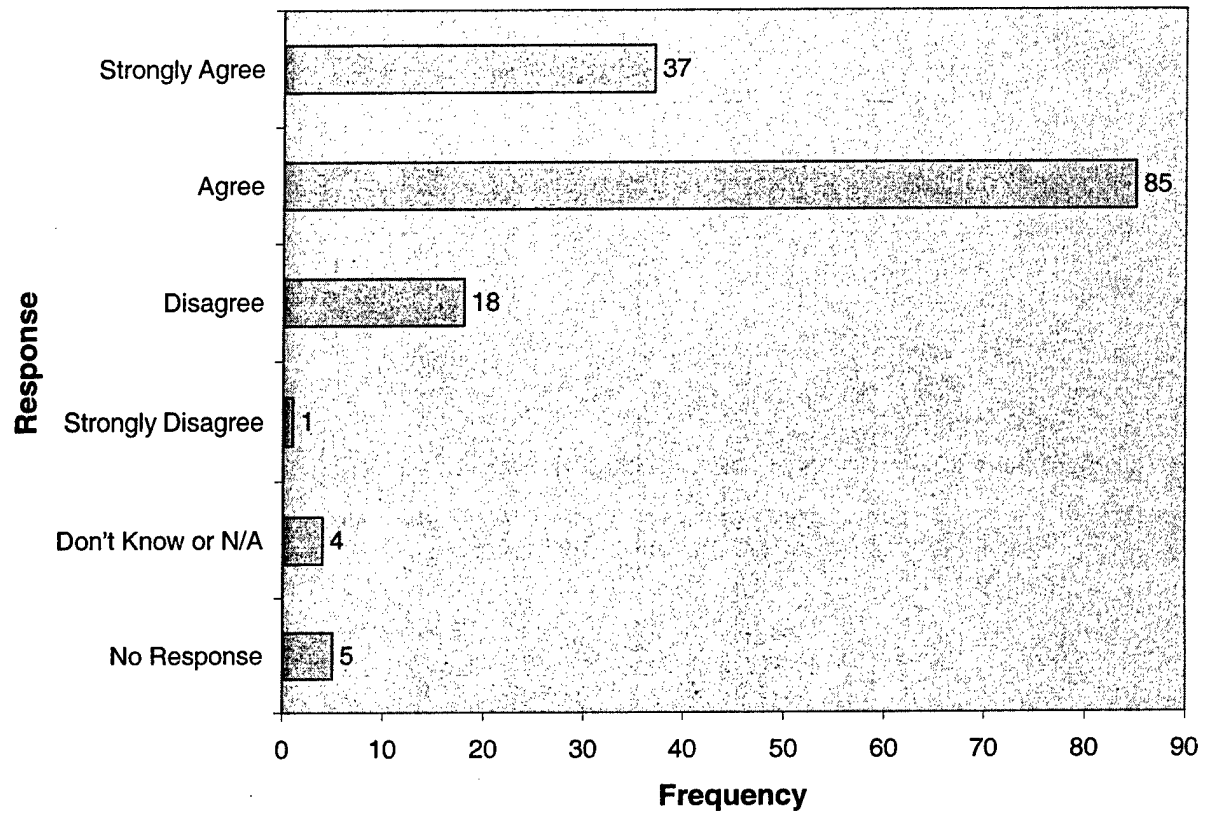


Summary

Total number	150
Strongly Agree and Agree	79%
Strongly Disagree and Disagree	13%
Don't Know or N/A	5%

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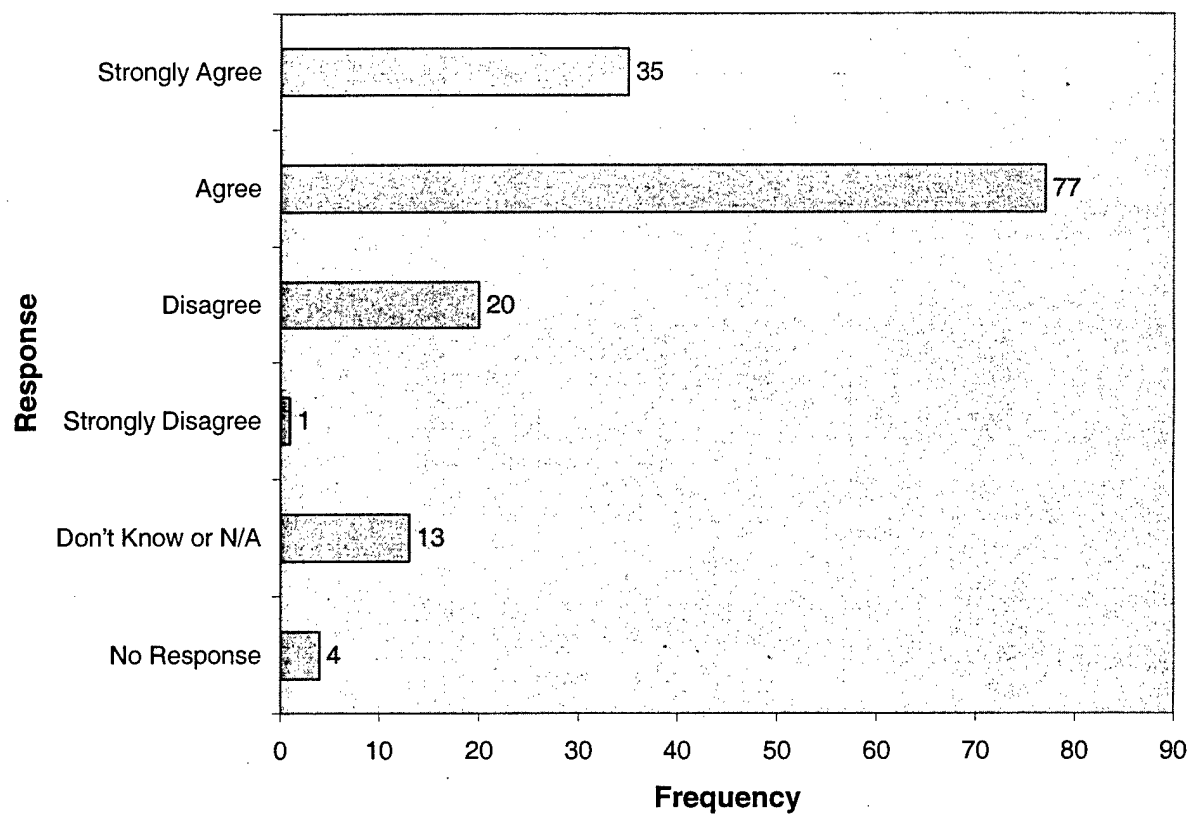
Figure 33: The acquisition project uses metrics as an input to program decision making.



Summary

Total number	150
Strongly Agree and Agree	81%
Strongly Disagree and Disagree	13%
Don't Know or N/A	3%

Figure 34: The performance, cost, and schedule objectives of the software acquisition project are measured and controlled throughout the software acquisition.

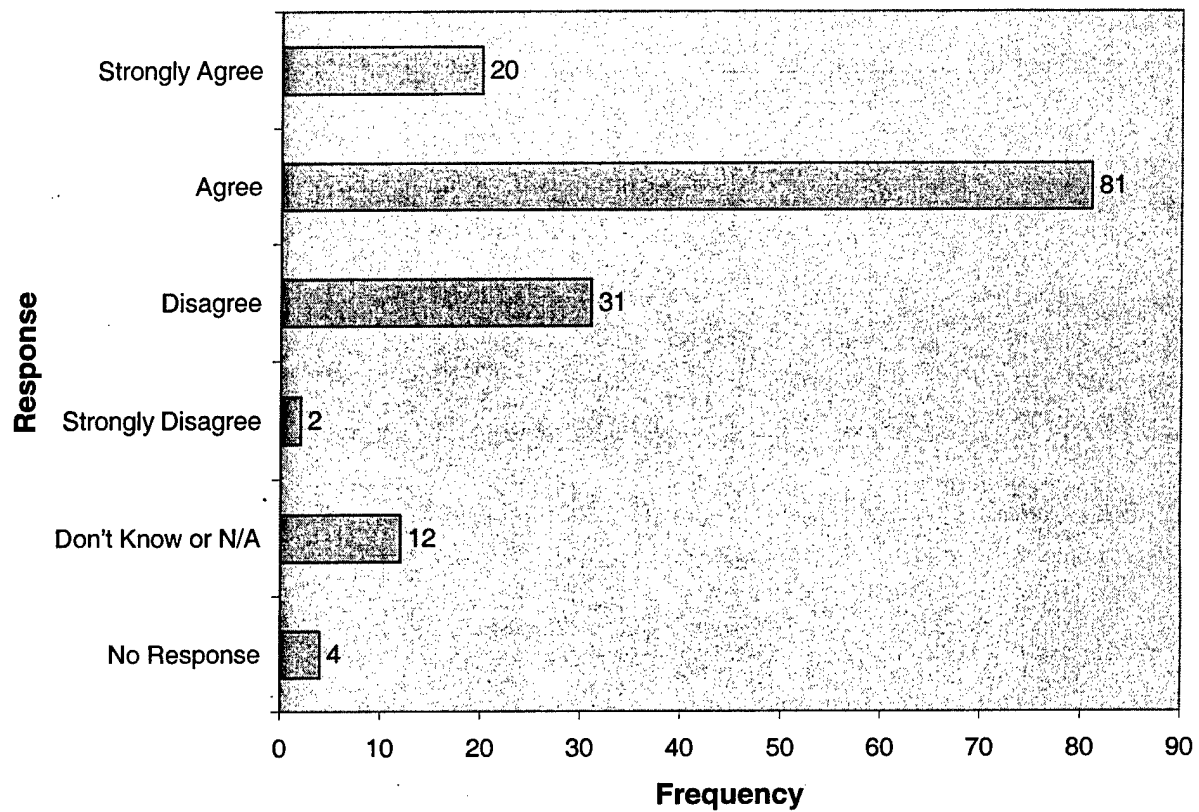


Summary

Total number	150
Strongly Agree and Agree	75%
Strongly Disagree and Disagree	14%
Don't Know or N/A	9%

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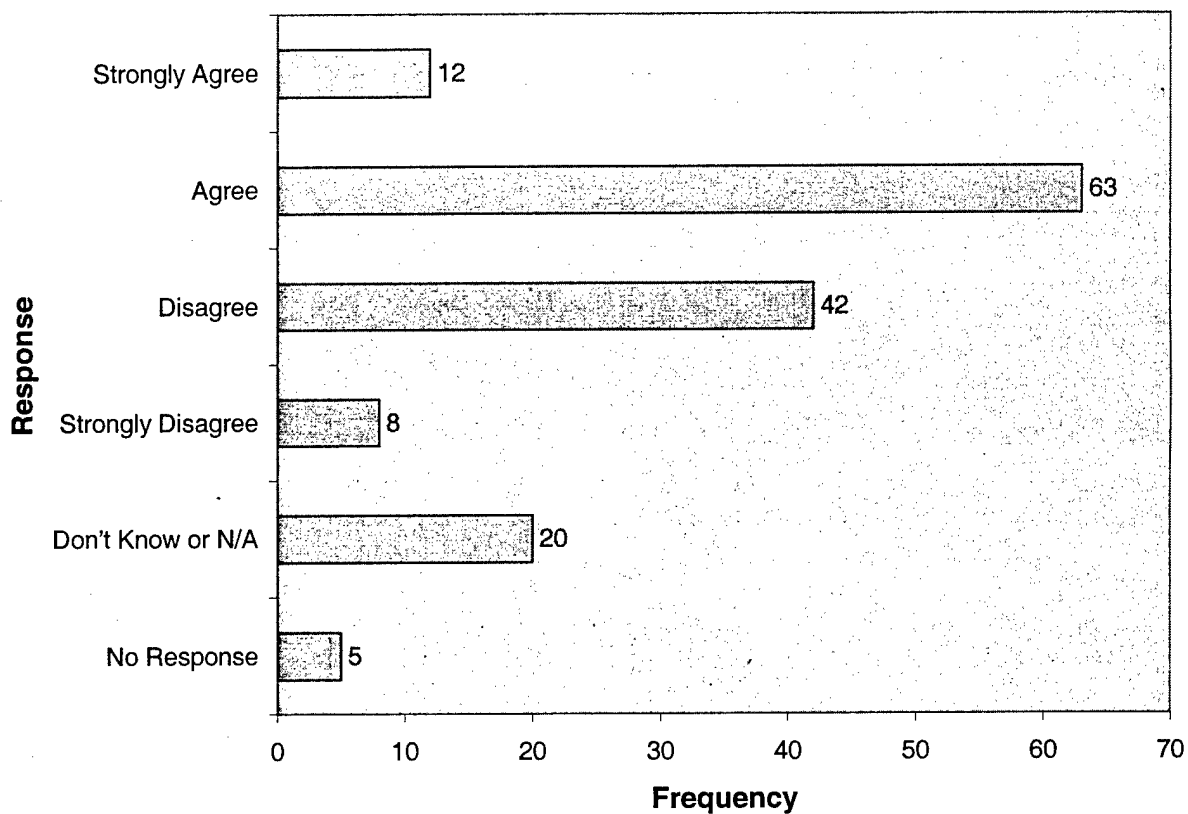
Figure 35: Your project team uses measures and analytic techniques for statistically managing selected processes and sub-processes.



Summary

Total number	150
Strongly Agree and Agree	67%
Strongly Disagree and Disagree	22%
Don't Know or N/A	8%

Figure 36: Your project team records statistical and quality management data in the organization's measurement repository and uses that information for decision making.

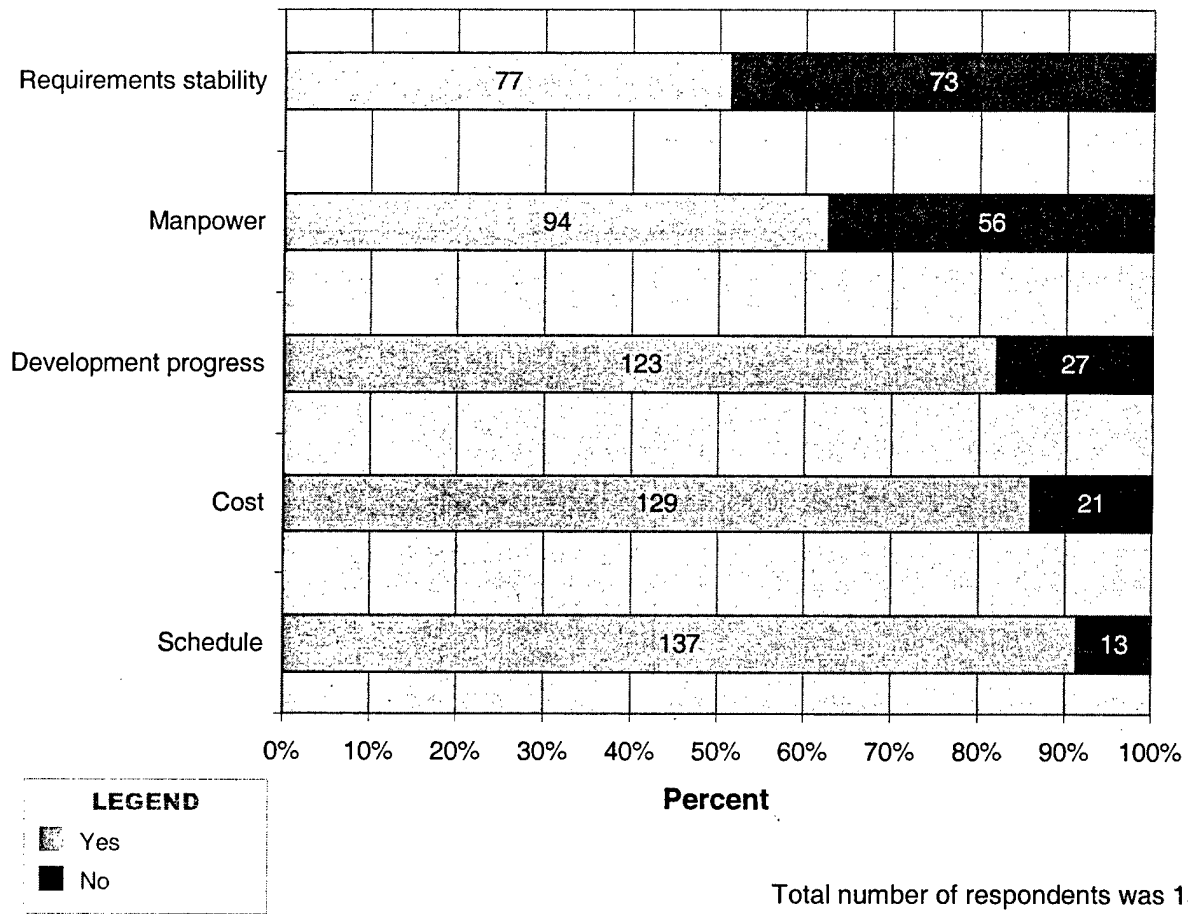


Summary

Total number	150
Strongly Agree and Agree	50%
Strongly Disagree and Disagree	33%
Don't Know or N/A	13%

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Figure 37: The following metrics are reported to the PMO on (at least) a monthly basis.



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7.2.4 Solicitation

Synopsis

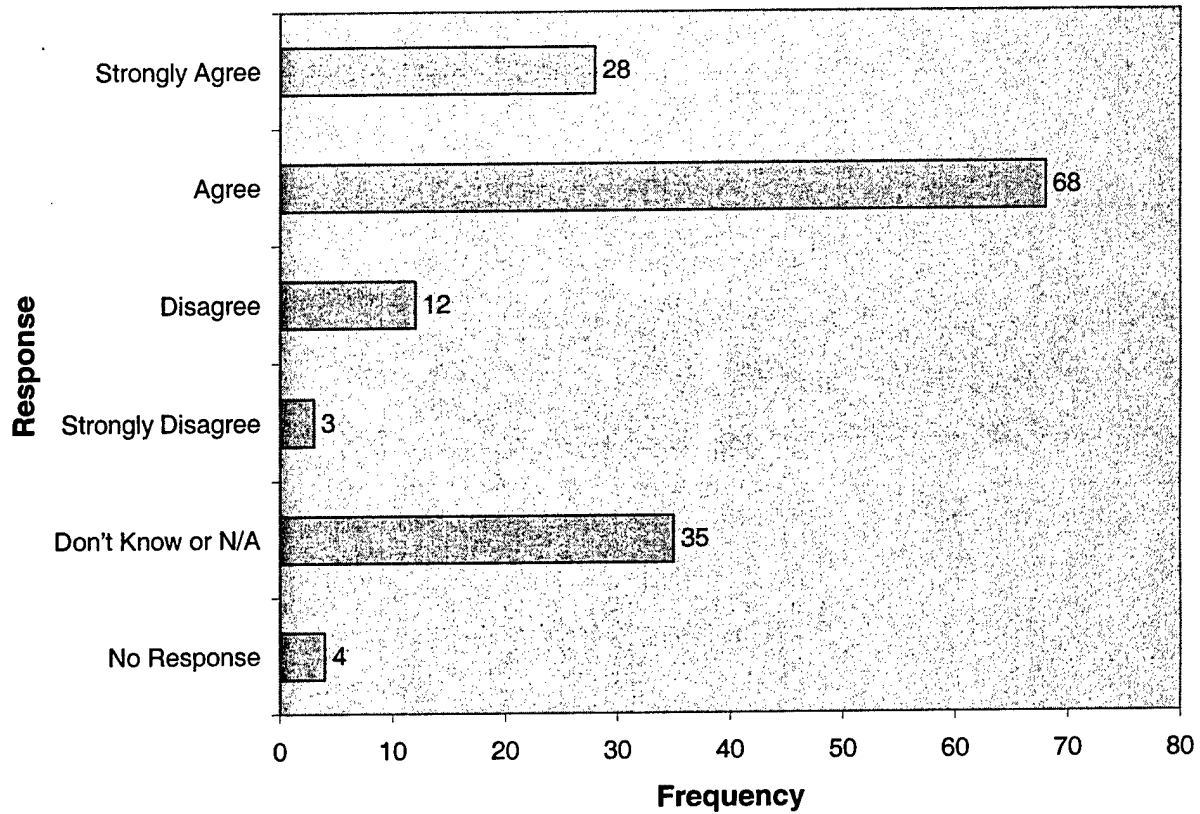
This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
The selection official has sufficient software technical expertise to select a qualified contractor.	64
The software-related contractual requirements baseline is established prior to release of the solicitation package.	63
The solicitation package includes the contractual software requirements and proposal evaluation criteria.	72
Technical reviewers use proposal evaluation criteria during solicitation activities.	80
Software risks are independently evaluated as part of the solicitation and are communicated to the solicitation official.	58

Detailed response profiles

The detailed response profiles are presented on the following pages.

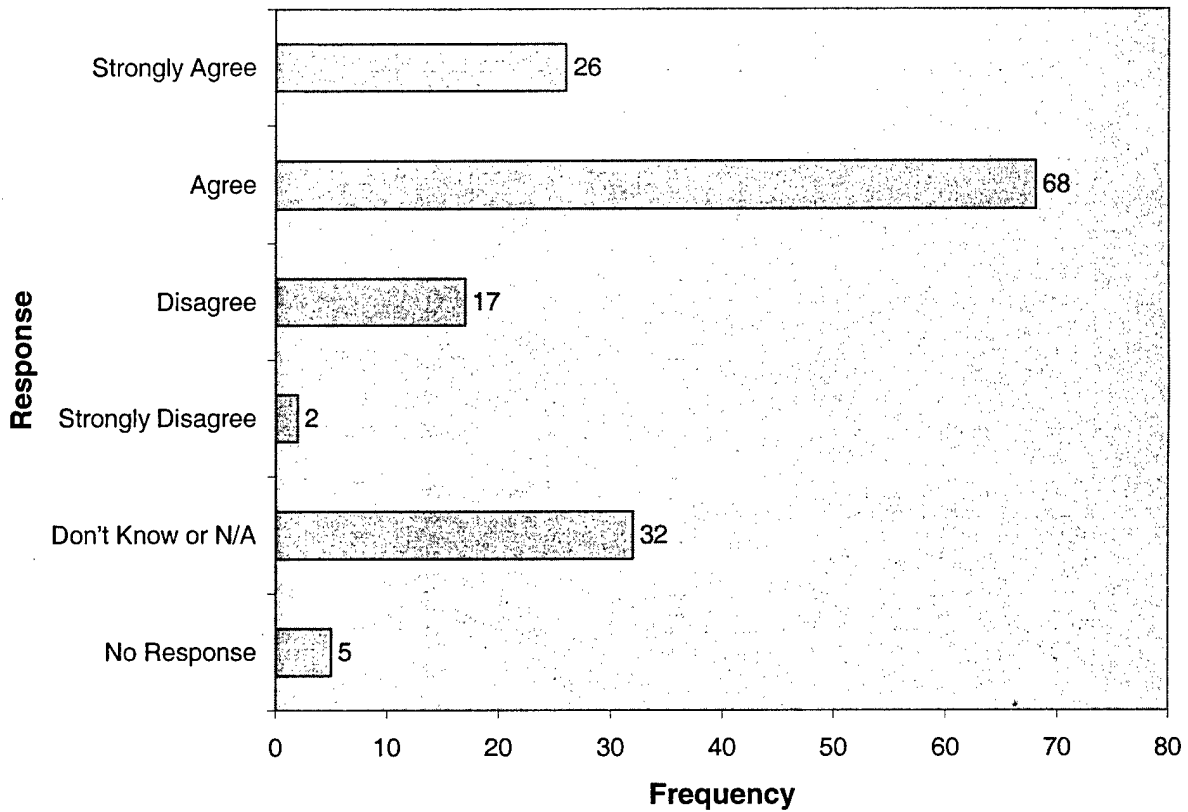
Figure 38: The selection official has sufficient software technical expertise to select a qualified contractor.



Summary

Total number	150
Strongly Agree and Agree	64%
Strongly Disagree and Disagree	10%
Don't Know or N/A	23%

Figure 39: The software-related contractual requirements baseline is established prior to release of the solicitation package.

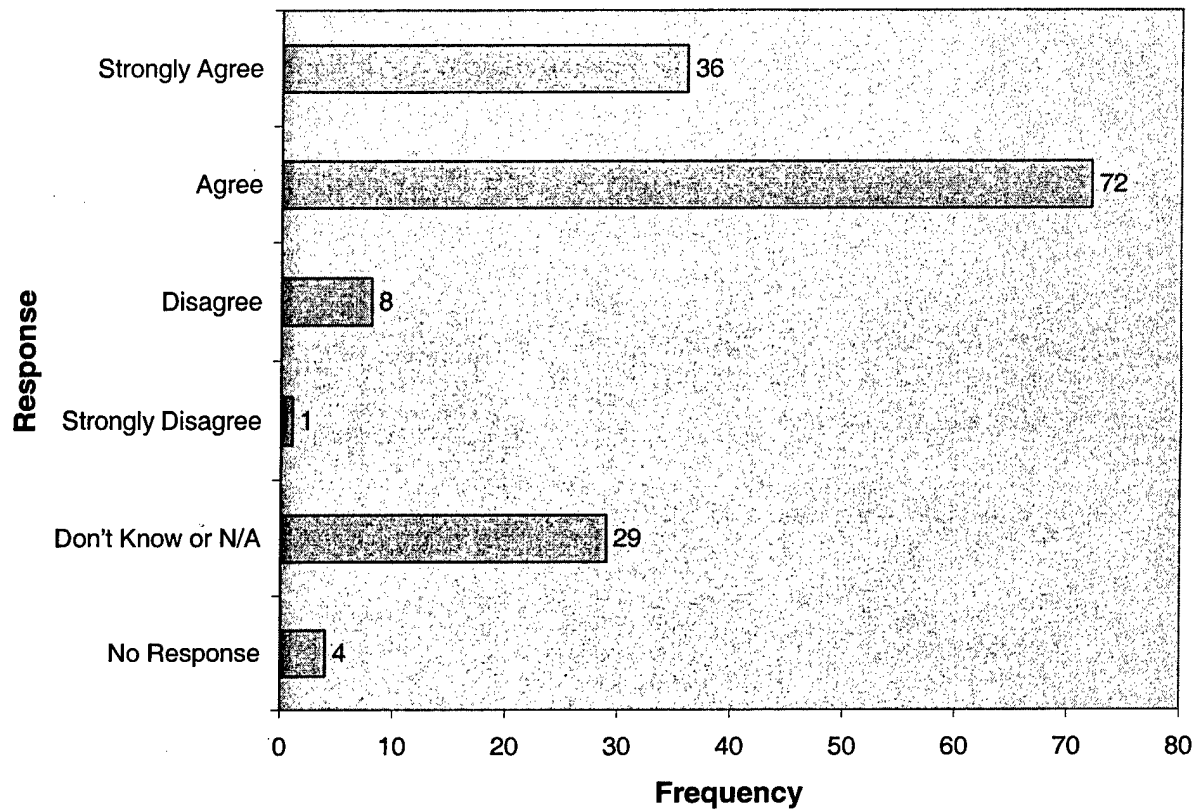


Summary

Total number	150
Strongly Agree and Agree	63%
Strongly Disagree and Disagree	13%
Don't Know or N/A	21%

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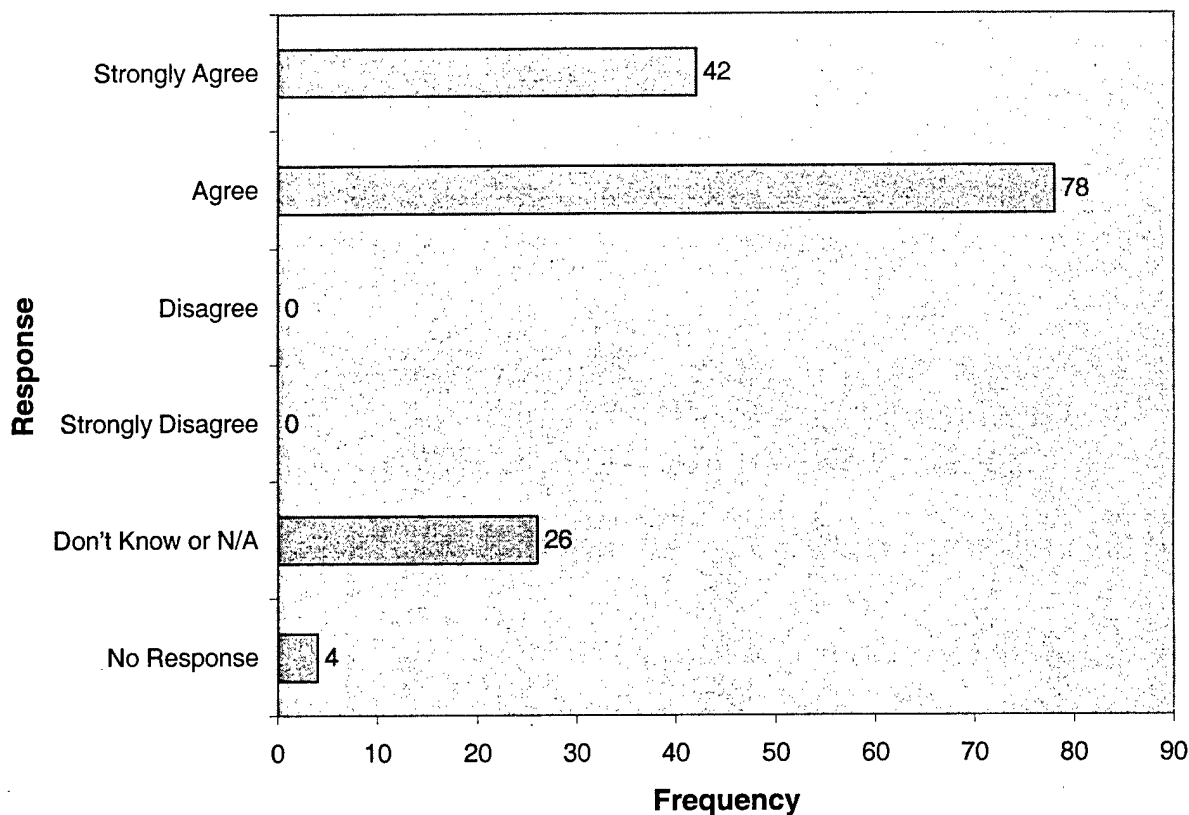
Figure 40: The solicitation package includes the contractual software requirements and proposal evaluation criteria.



Summary

Total number	150
Strongly Agree and Agree	72%
Strongly Disagree and Disagree	6%
Don't Know or N/A	19%

Figure 41: Technical reviewers use proposal evaluation criteria during solicitation activities.

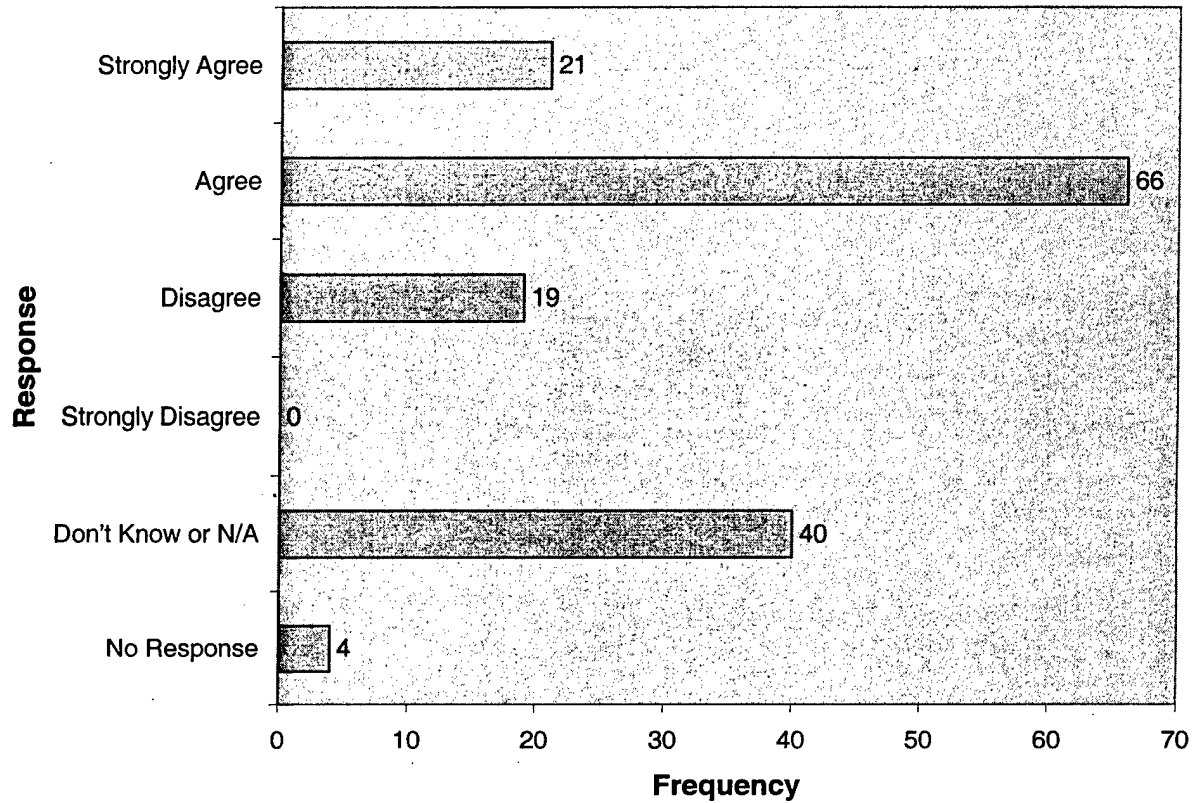


Summary

Total number	150
Strongly Agree and Agree	80%
Strongly Disagree and Disagree	0%
Don't Know or N/A	17%

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Figure 42: Software risks are independently evaluated as part of the solicitation and are communicated to the solicitation official.



summary	Total number	150
	Strongly Agree and Agree	58%
	Strongly Disagree and Disagree	13%
	Don't Know or N/A	6%

7.2.5 Software-Related Contractual Requirements Development and Management

Synopsis

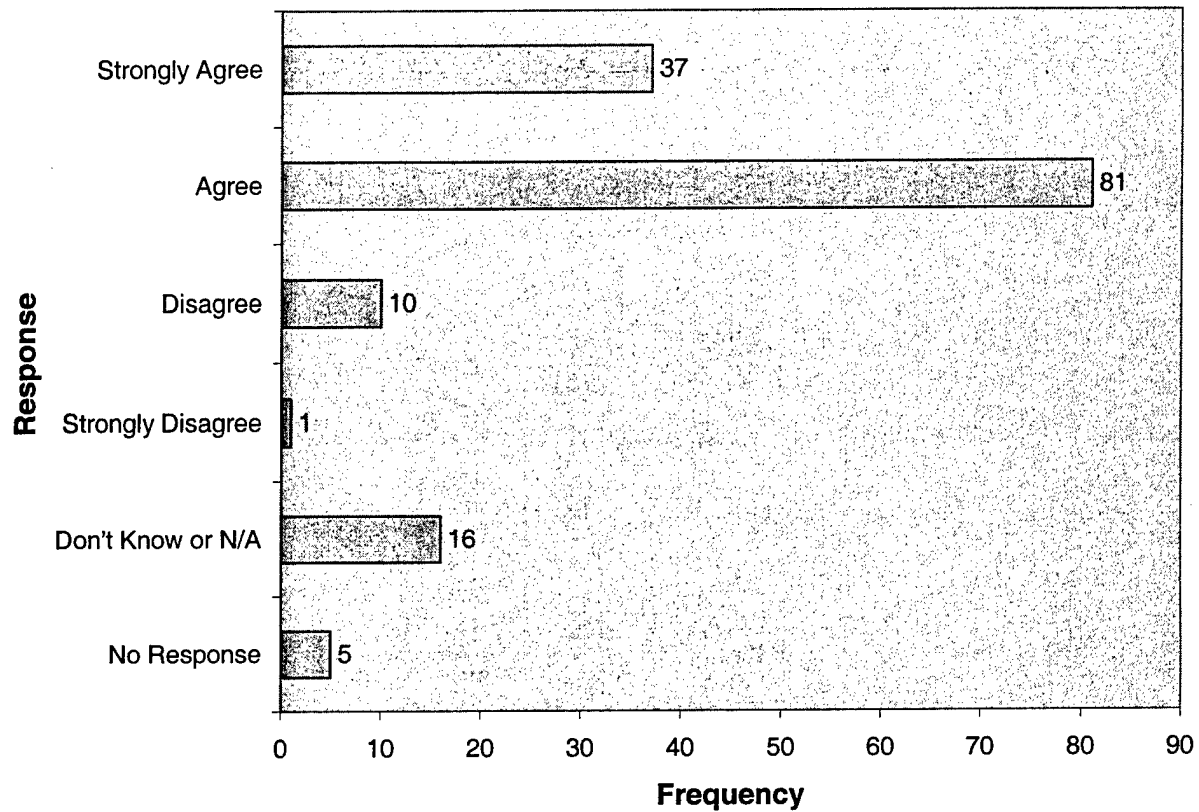
This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
Software-related contractual requirements are developed, managed, and maintained using a structured process.	79
End users and other affected groups have input to the software-related contractual requirements over the life of the acquisition.	78
A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.	66
In the case of new and/or changing program requirements, acquisition project staff know when and how to make changes to contractual requirements, including acceptance criteria.	79
A formal control board is in place to authorize changes to requirements.	73

Detailed response profiles

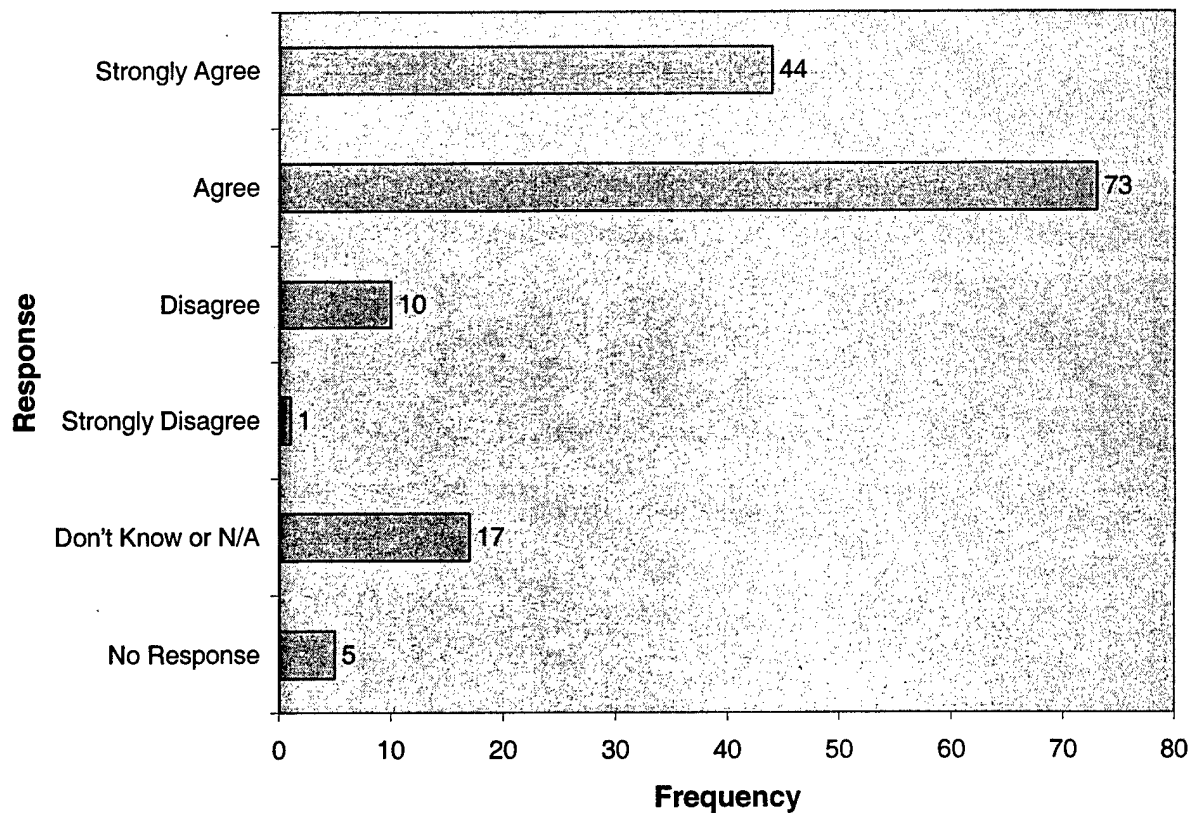
The detailed response profiles are presented on the following pages.

Figure 43: Software-related contractual requirements are developed, managed, and maintained using a structured process.



Summary	Total number	150
	Strongly Agree and Agree	79%
	Strongly Disagree and Disagree	7%
	Don't Know or N/A	11%

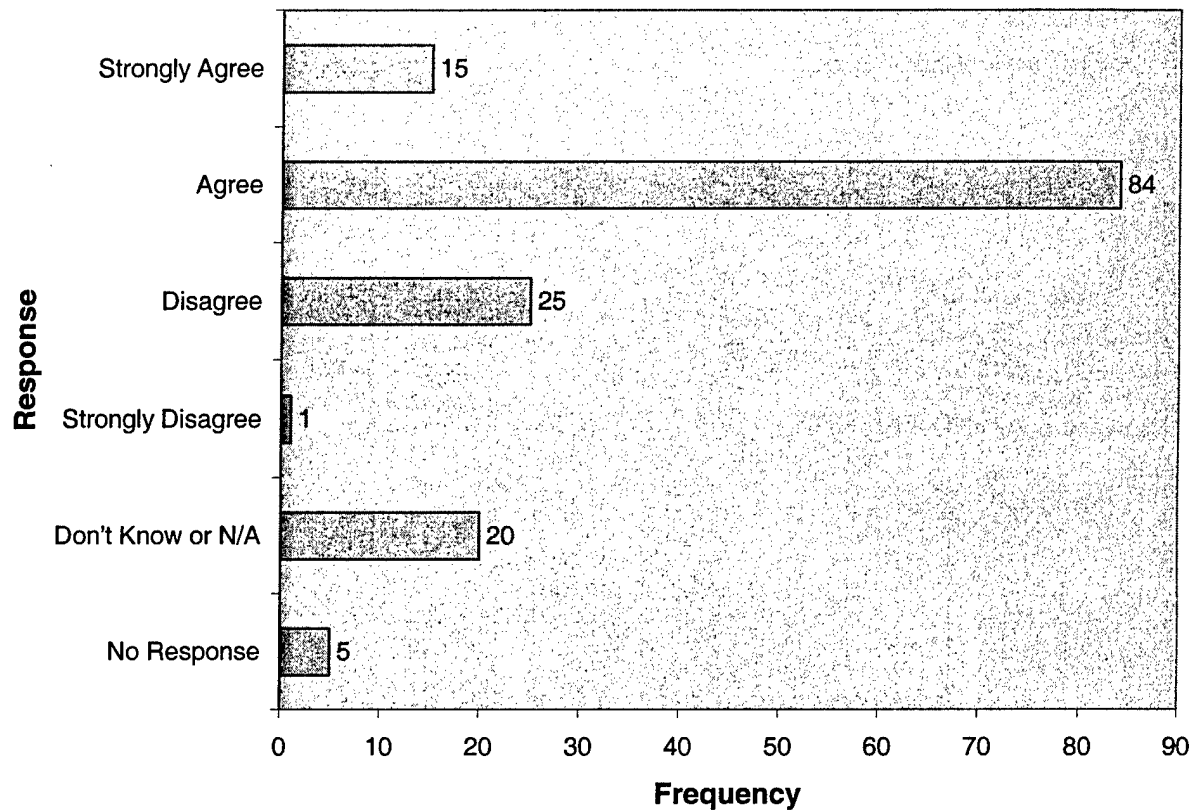
Figure 44: End users and other affected groups have input to the software-related contractual requirements over the life of the acquisition.



Summary

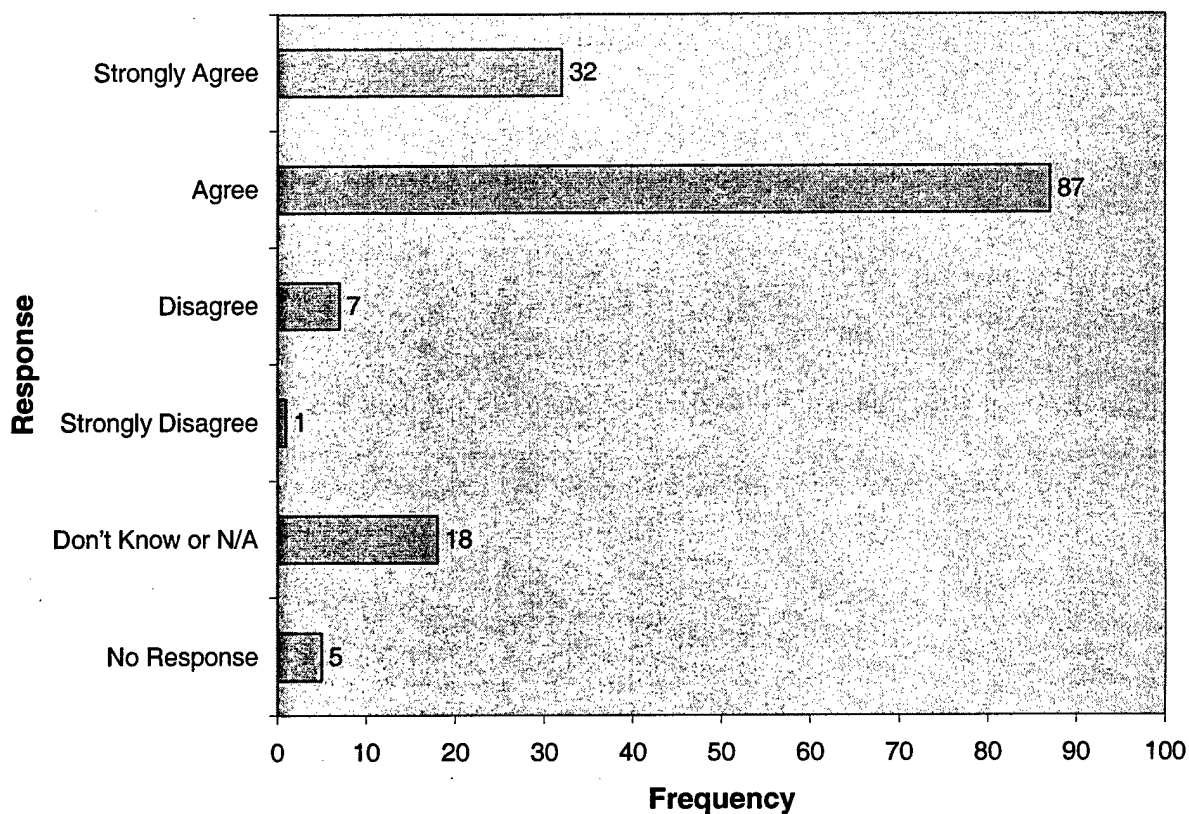
Total number	150
Strongly Agree and Agree	78%
Strongly Disagree and Disagree	7%
Don't Know or N/A	11%

Figure 45: A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.



Summary	Total number	150
	Strongly Agree and Agree	66%
	Strongly Disagree and Disagree	17%
	Don't Know or N/A	13%

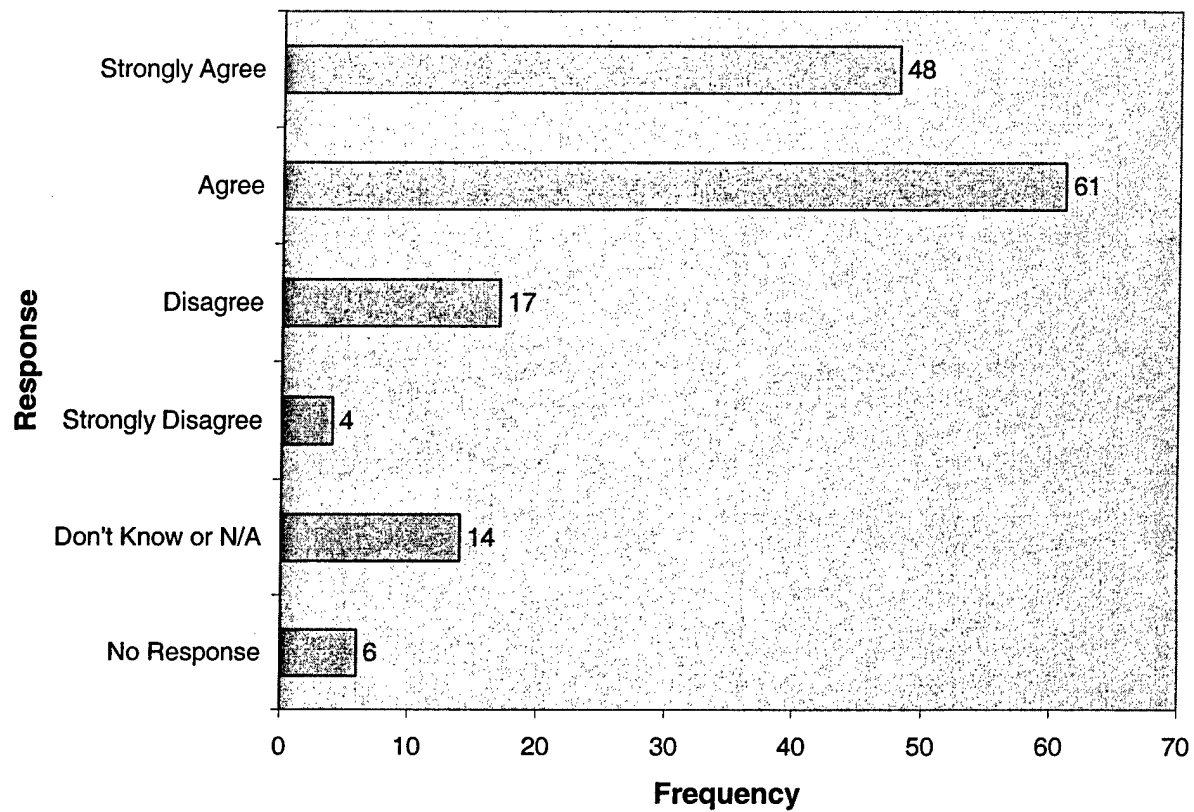
Figure 46: In the case of new and/or changing program requirements, acquisition project staff know when and how to make changes to contractual requirements, including acceptance criteria.



Summary

Total number	150
Strongly Agree and Agree	79%
Strongly Disagree and Disagree	5%
Don't Know or N/A	12%

Figure 47: A formal control board is in place to authorize changes to requirements.



Summary

Total number	150
Strongly Agree and Agree	73%
Strongly Disagree and Disagree	14%
Don't Know or N/A	9%

7.2.6 Contract Performance Management

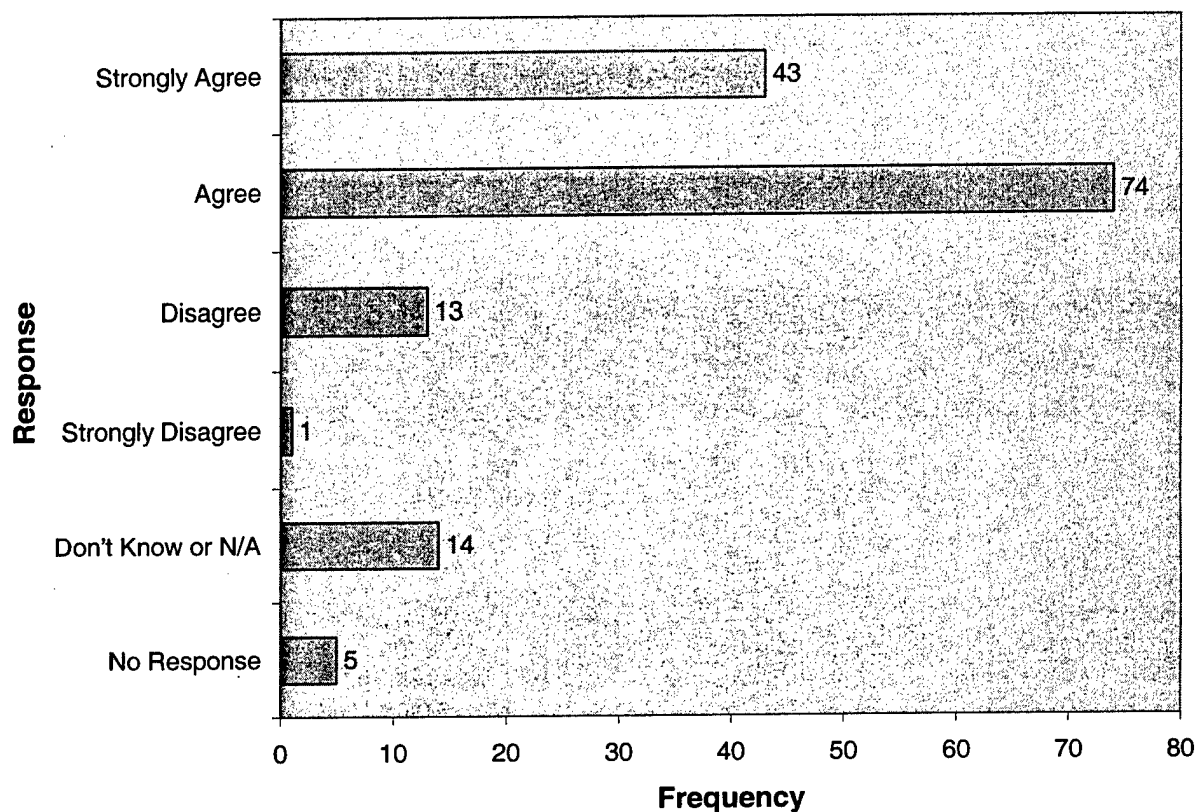
Purpose The purpose of the set of questionnaire items presented in this section was to address whether the respondent's project team ensures that the software activities under contract are being performed in accordance with contractual requirements.

Synopsis This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
The project team has sufficient insight into the contractor's software engineering effort to ensure that the effort is managed and controlled and complies with contract requirements.	78
The acquisition project team and contractor team maintain ongoing communication and both parties agree to commitments.	86
Your project team identifies, documents, and tracks software risks associated with the contractor's efforts, independent of the contractor's risk management process.	67
The quality of the contractor team's process, performance, products, and services are appraised throughout the contract's period of performance to identify risks and take action to mitigate those risks as early as possible.	78

Detailed response profiles The detailed response profiles are presented on the following pages.

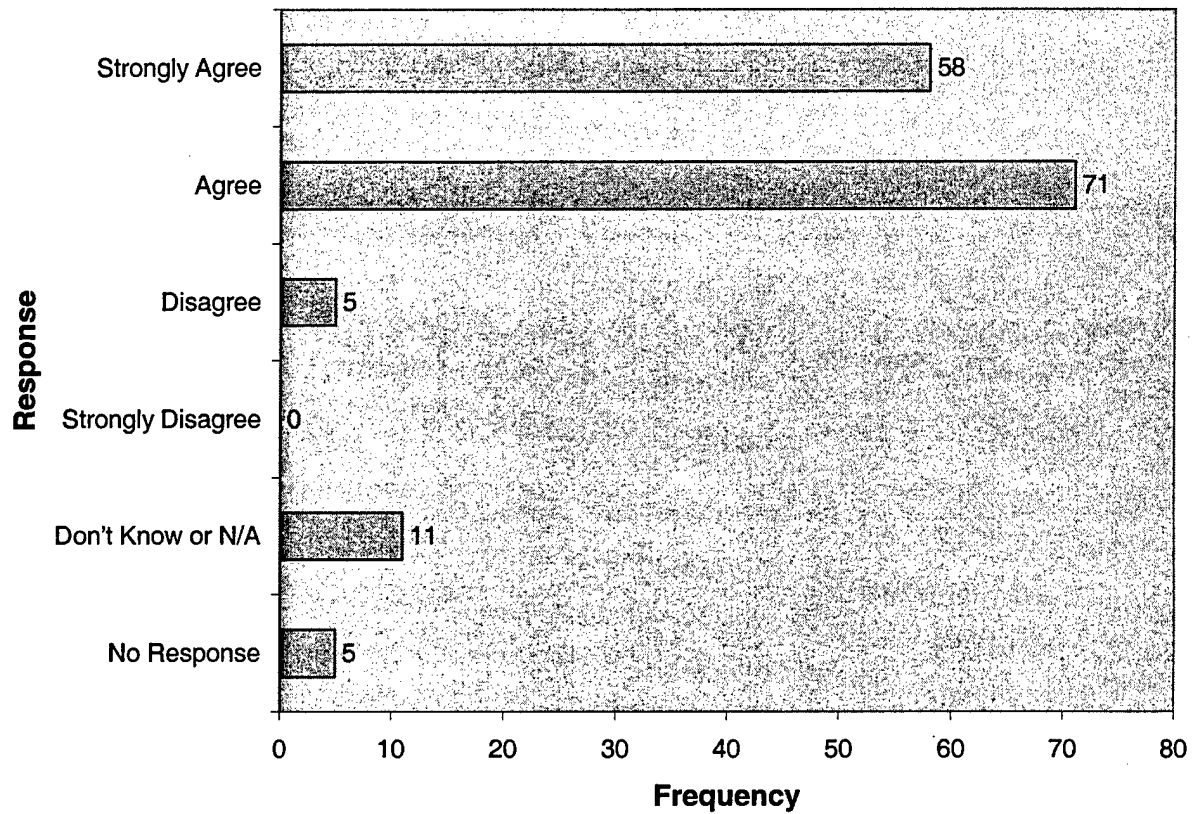
Figure 48: The project team has sufficient insight into the contractor's software engineering effort to ensure that the effort is managed and controlled and complies with contract requirements.



Summary

Total number	150
Strongly Agree and Agree	78%
Strongly Disagree and Disagree	9%
Don't Know or N/A	9%

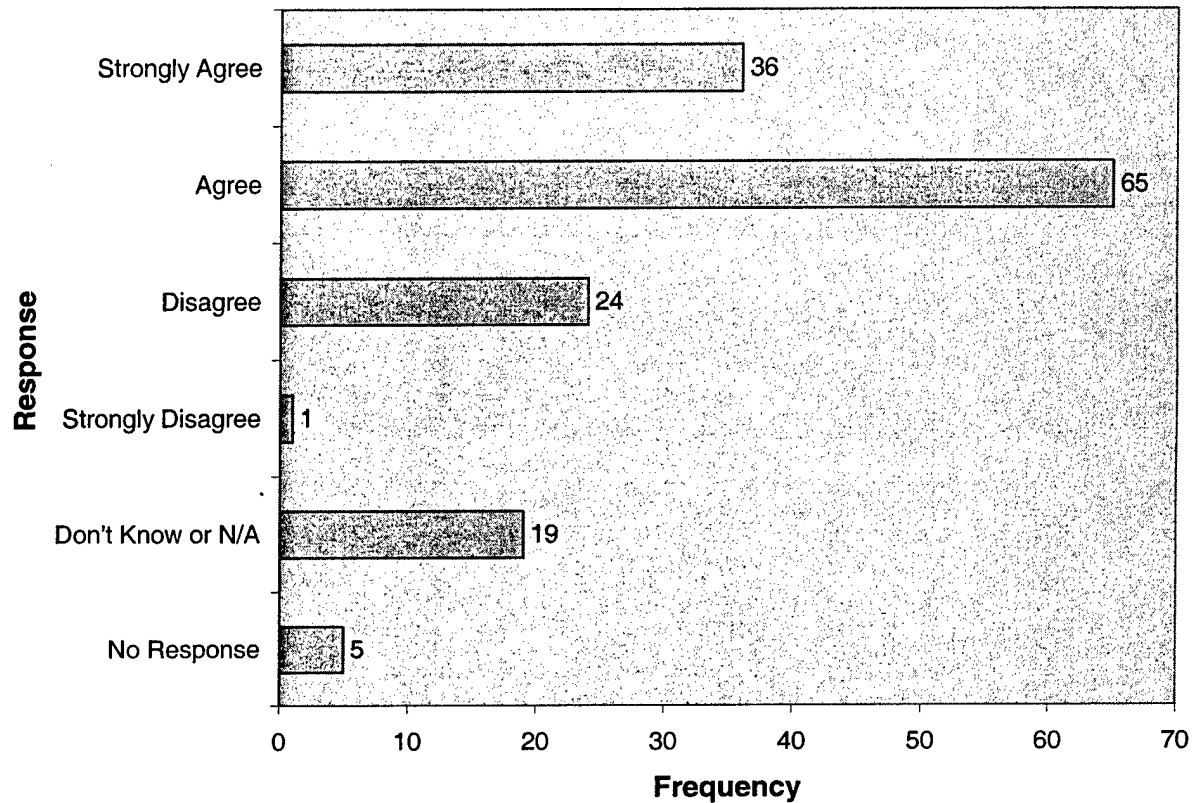
Figure 49: The acquisition project team and contractor team maintain ongoing communication and both parties agree to commitments.



Summary

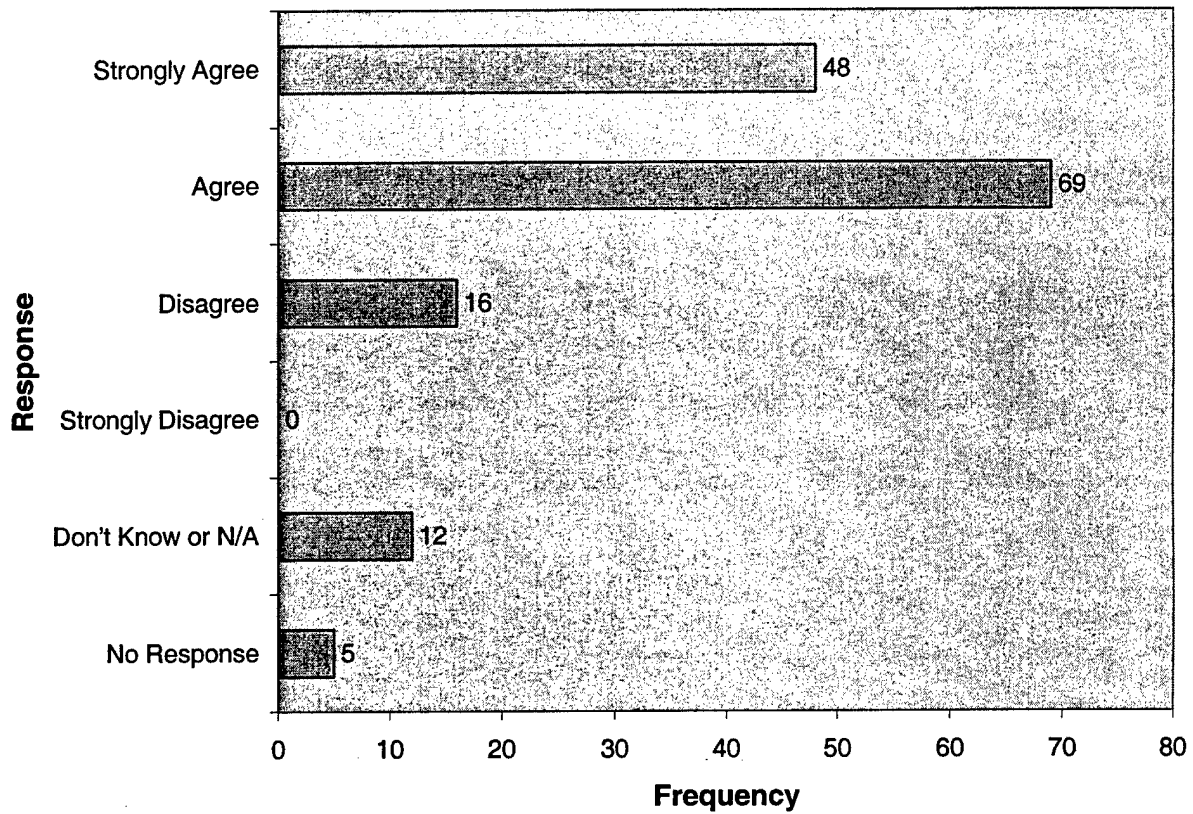
Total number	150
Strongly Agree and Agree	86%
Strongly Disagree and Disagree	3%
Don't Know or N/A	7%

Figure 50: Your project team identifies, documents, and tracks software risks associated with the contractor's efforts, independent of the contractor's risk management process.



Summary	Total number	150
	Strongly Agree and Agree	67%
	Strongly Disagree and Disagree	17%
	Don't Know or N/A	13%

Figure 51: The quality of the contractor team's process, performance, products, and services are appraised throughout the contract's period of performance to identify risks and take action to mitigate those risks as early as possible.



Summary

Total number	150
Strongly Agree and Agree	78%
Strongly Disagree and Disagree	11%
Don't Know or N/A	8%

7.2.7 Transition to Support

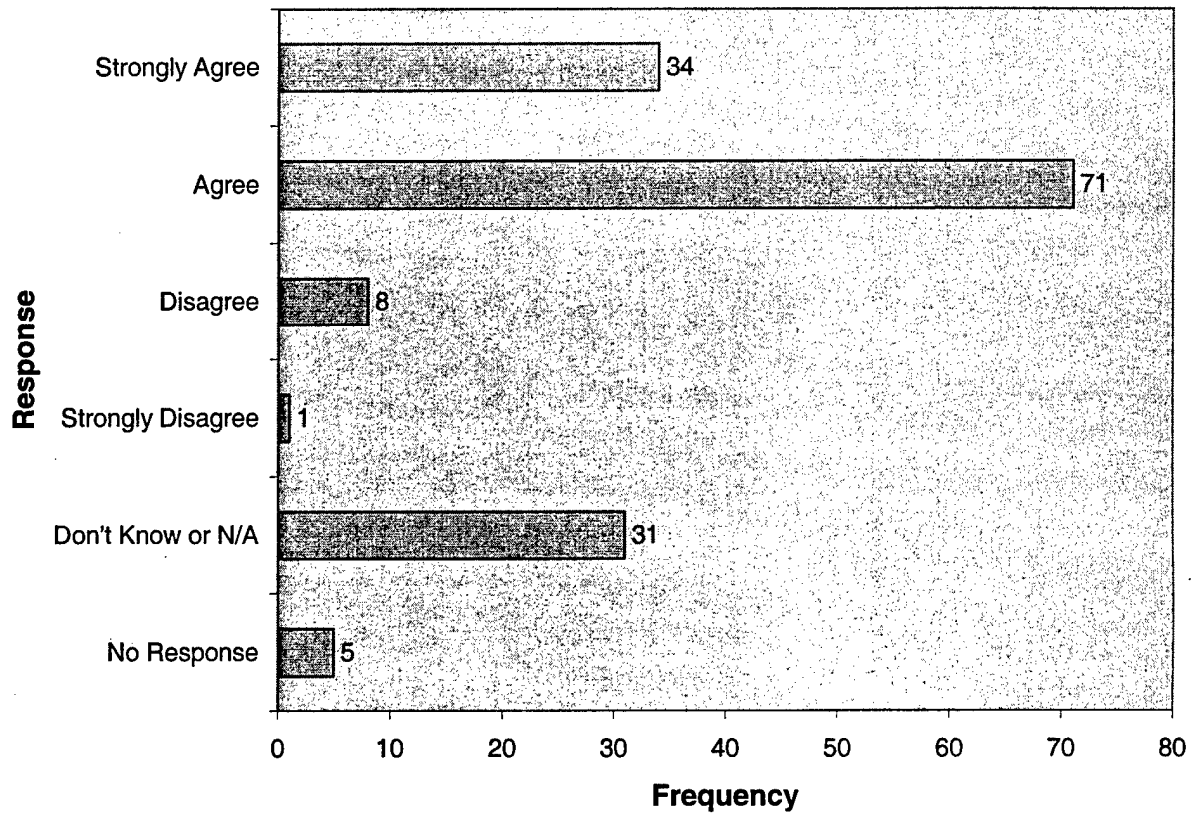
Purpose The purpose of the set of questionnaire items presented in this section was to address whether projects provide for the transition of the software products being acquired to the eventual software support organization.

Synopsis This table shows the percentage of respondents who selected “Strongly Agree” or “Agree” for their responses.

Questionnaire Item	Agree
The acquisition project team ensures that the software support organization has the capacity and capability to provide the required support upon assumption of responsibility for the support of the software products.	70
The acquisition project team ensures that there is no loss in continuity of support to the software products during transition from the development contractor to the software support organization.	69
Configuration management of the software products is maintained throughout the transition.	70
The strategy for transition into maintenance is documented, communicated, and agreed to by all parties early in the acquisition.	66

Detailed response profiles The detailed response profiles are presented on the following pages.

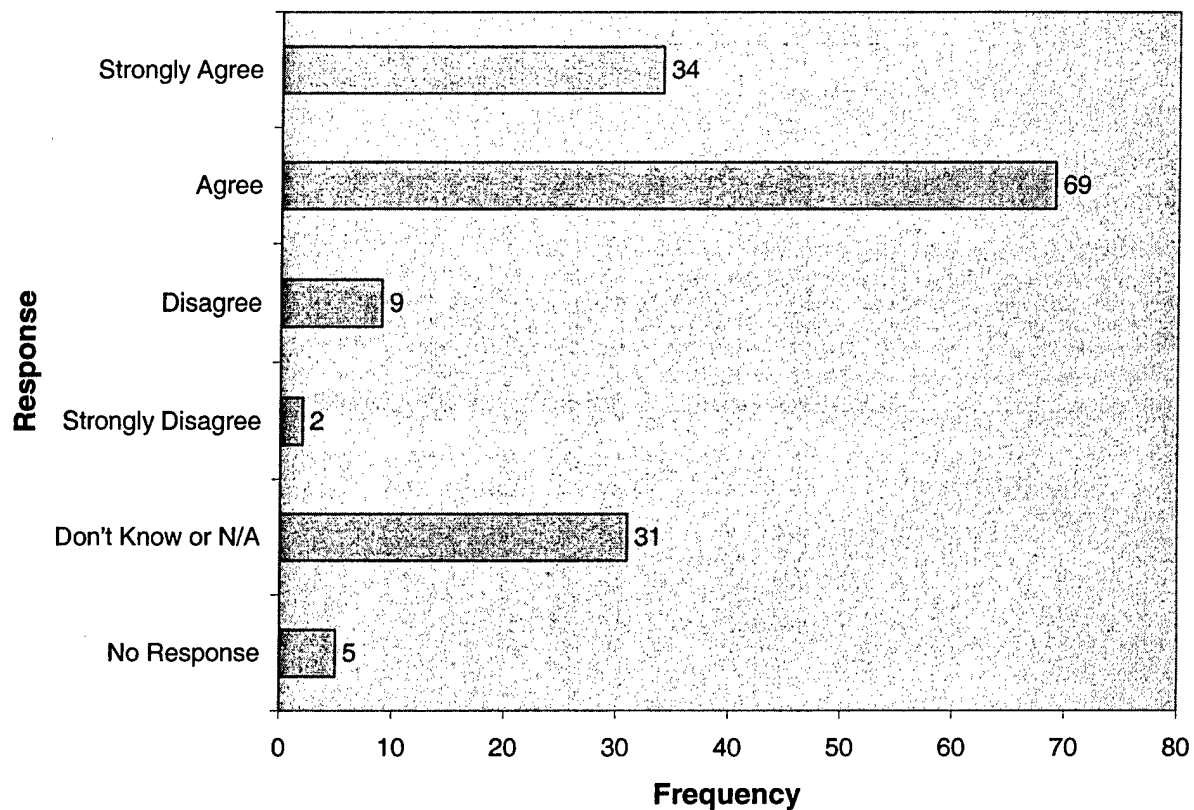
Figure 52: The acquisition project team ensures that the software support organization has the capacity and capability to provide the required support upon assumption of responsibility for the support of the software products.



Summary

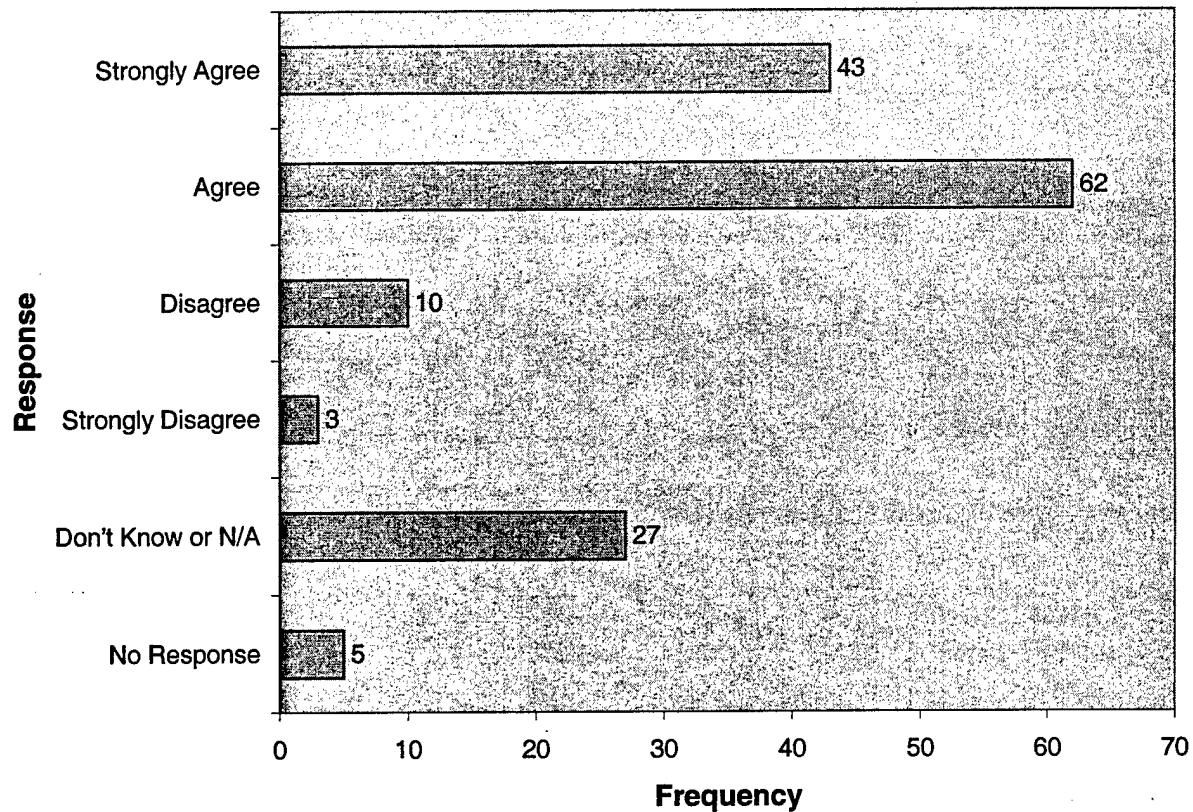
Total number	150
Strongly Agree and Agree	70%
Strongly Disagree and Disagree	6%
Don't Know or N/A	21%

Figure 53: The acquisition project team ensures that there is no loss in continuity of support to the software products during transition from the development contractor to the software support organization.



Summary	Total number	150
	Strongly Agree and Agree	69%
	Strongly Disagree and Disagree	7%
	Don't Know or N/A	21%

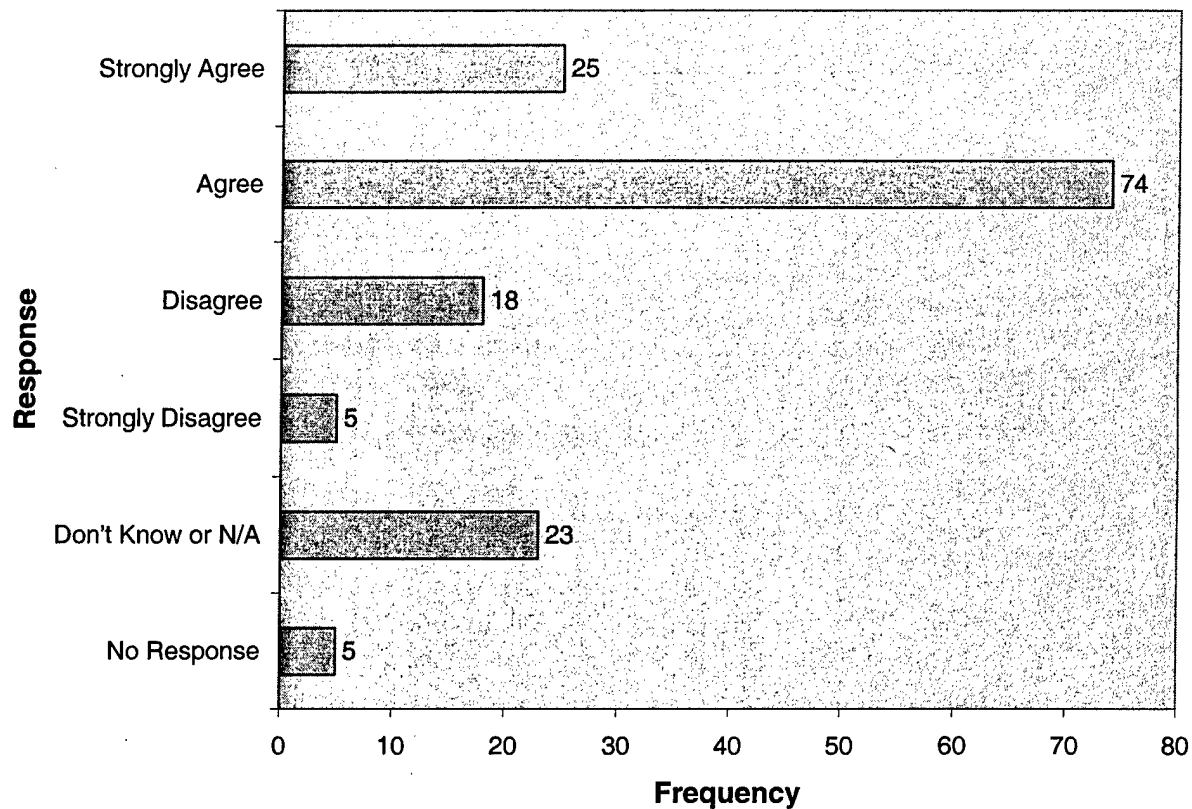
Figure 54: Configuration management of the software products is maintained throughout the transition.



Summary

Total number	150
Strongly Agree and Agree	70%
Strongly Disagree and Disagree	9%
Don't Know or N/A	18%

Figure 55: The strategy for transition into maintenance is documented, communicated, and agreed to by all parties early in the acquisition.



Summary

Total number	150
Strongly Agree and Agree	66%
Strongly Disagree and Disagree	15%
Don't Know or N/A	15%

7.2.8 Transition to Operations

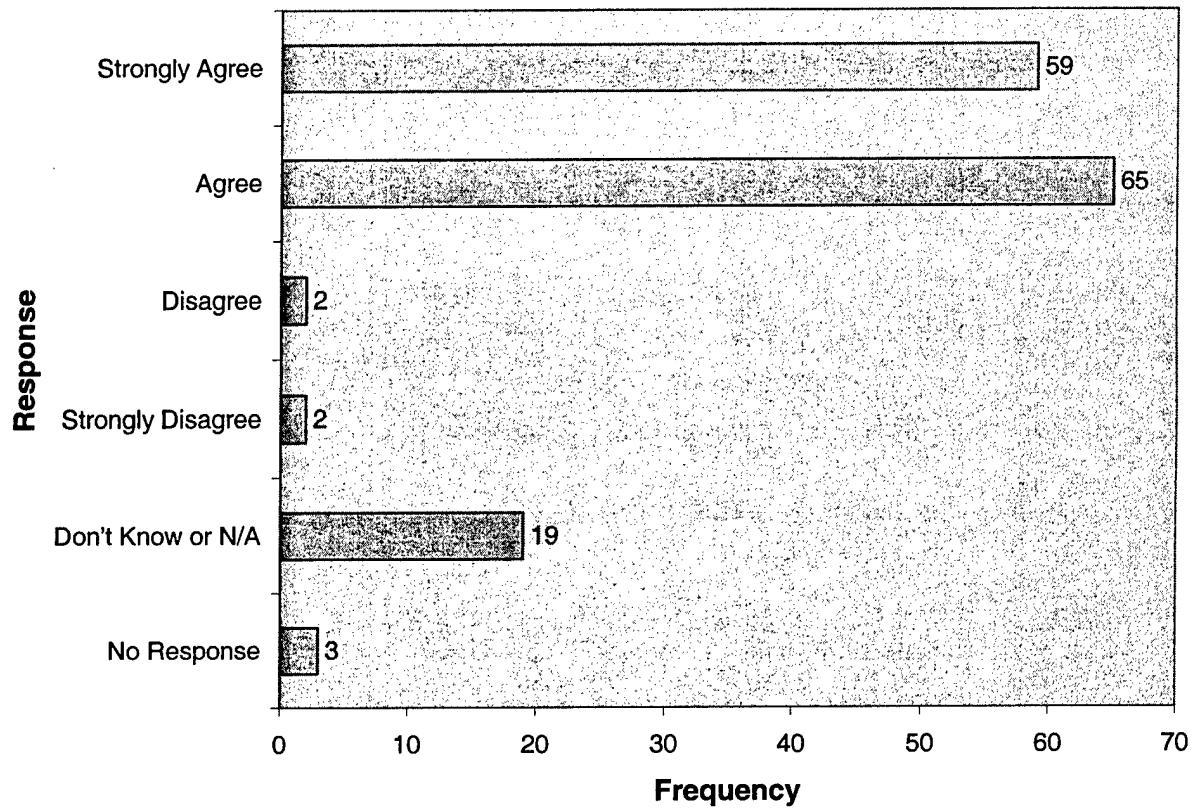
Purpose The purpose of the set of questionnaire items presented in this section was to address whether acquisition projects prepare for the transition of the software products being acquired to the end user.

Synopsis This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses.

Questionnaire Item	Agree
The acquisition project team ensures that the end user has the training, experience, and resources to accept the software products into operational use.	83
The acquisition project team plans for sufficient contractor support during end-user acceptance testing.	85
The strategy for transition into operations is documented, communicated, and agreed to by all parties in the acquisition.	81
The software support organization participates in all project and technical reviews.	70

Detailed response profiles The detailed response profiles are presented on the following pages.

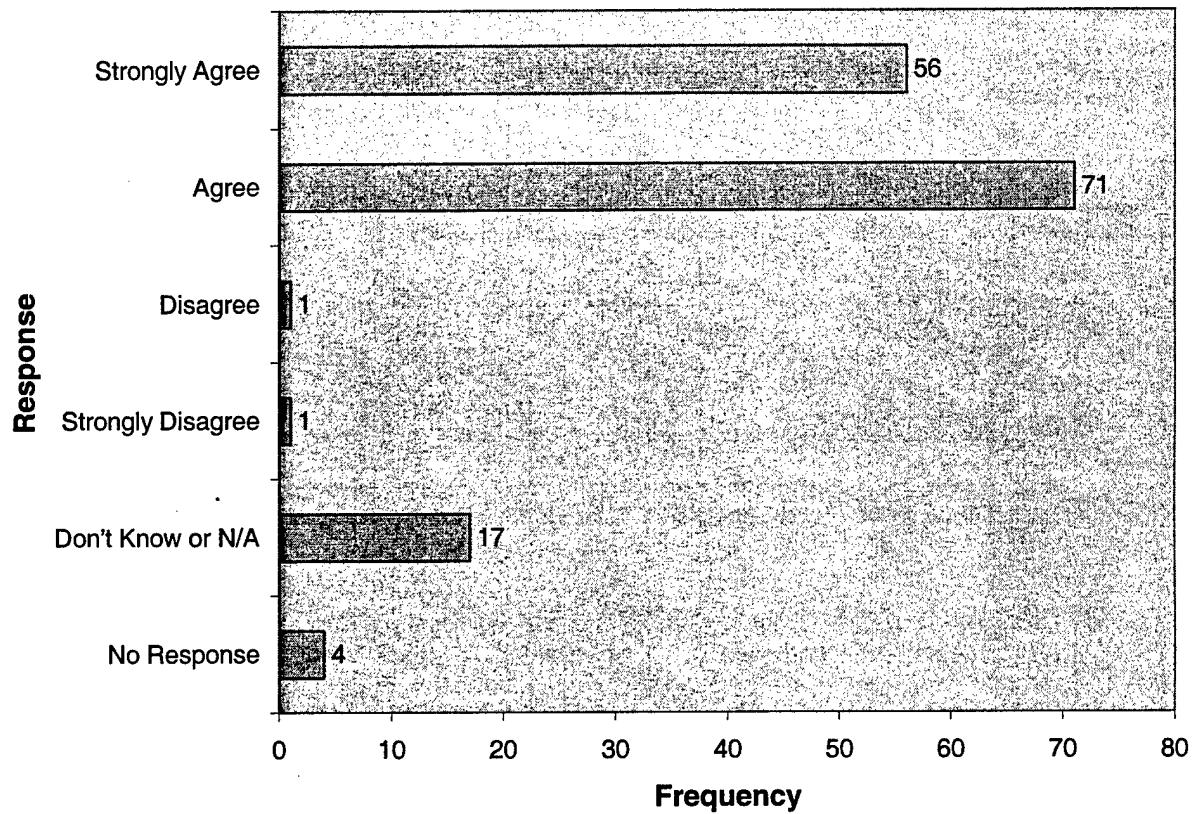
Figure 56: The acquisition project team ensures that the end user has the training, experience, and resources to accept the software products into operational use.



Summary

Total number	150
Strongly Agree and Agree	83%
Strongly Disagree and Disagree	3%
Don't Know or N/A	13%

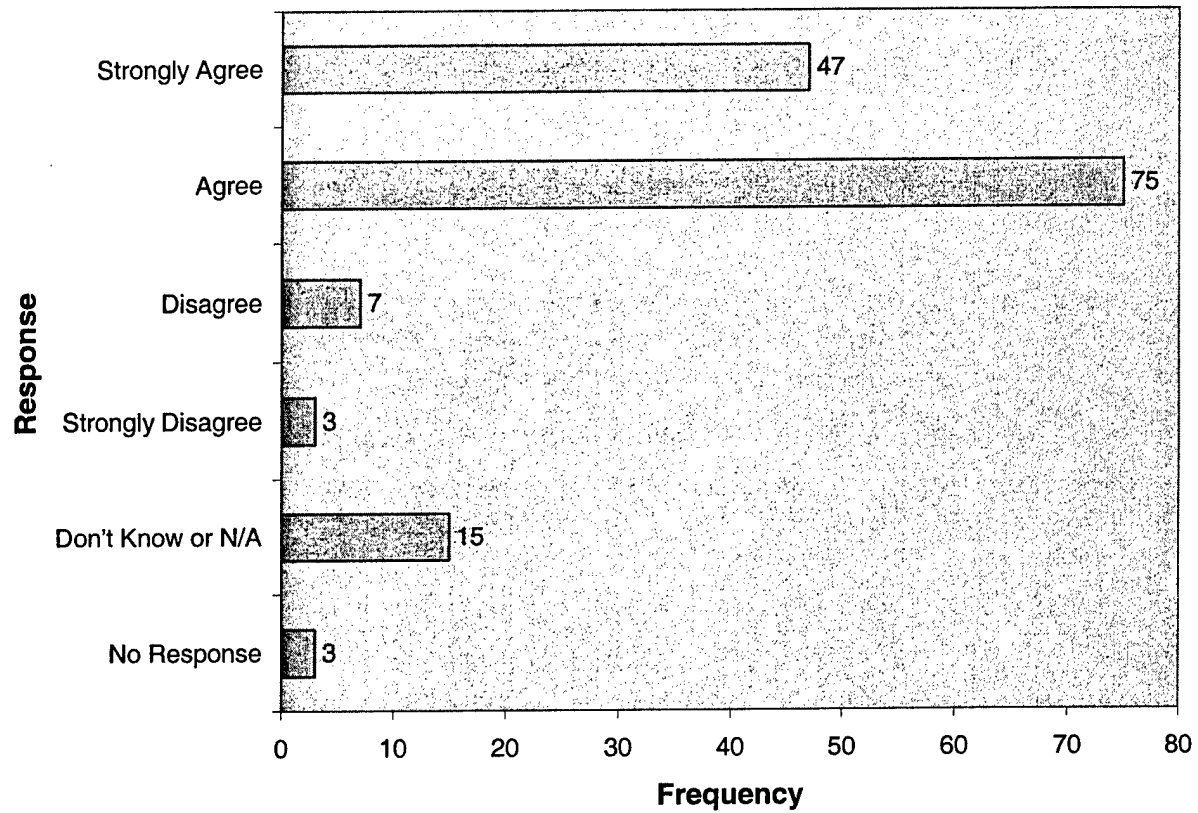
Figure 57: The acquisition project team plans for sufficient contractor support during end-user acceptance testing.



summary

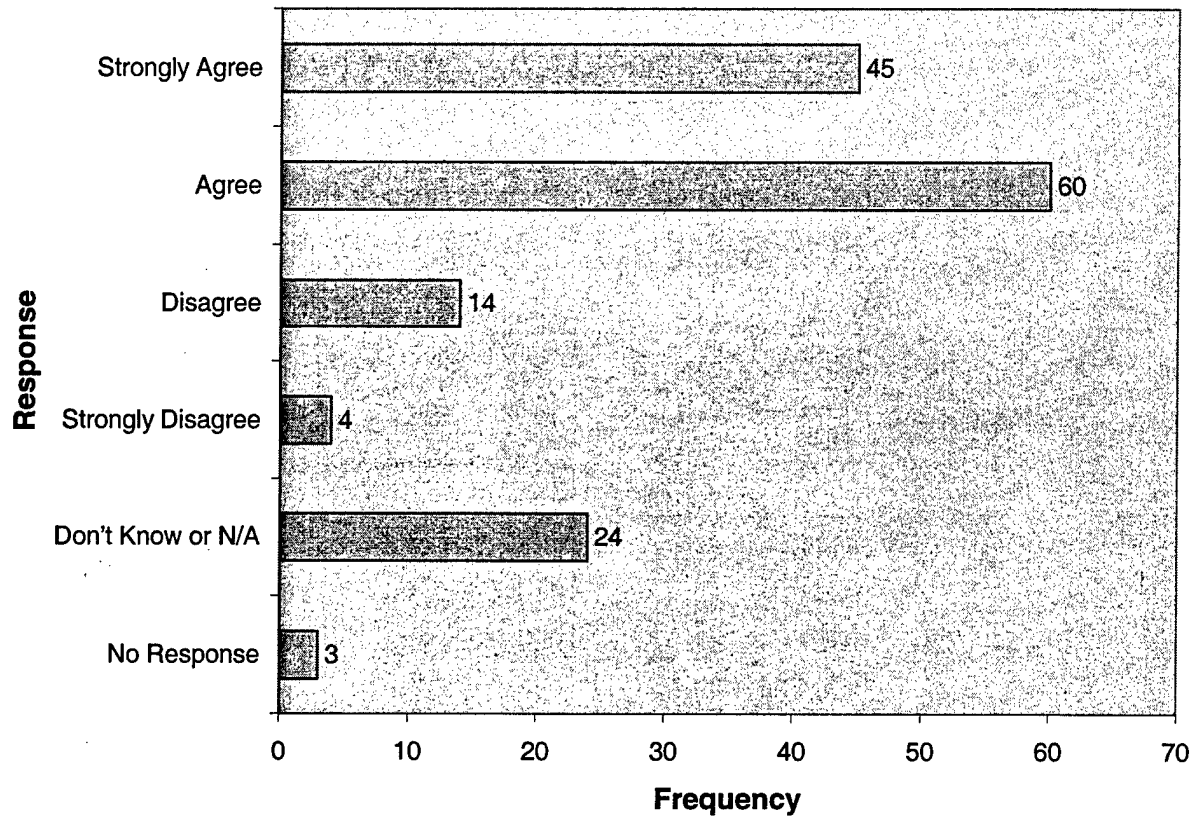
Total number	150
Strongly Agree and Agree	85%
Strongly Disagree and Disagree	1%
Don't Know or N/A	11%

Figure 58: The strategy for transition into operations is documented, communicated, and agreed to by all parties in the acquisition.



Summary	Total number	150
	Strongly Agree and Agree	81%
	Strongly Disagree and Disagree	7%
	Don't Know or N/A	10%

Figure 59: The software support organization participates in all project and technical reviews.



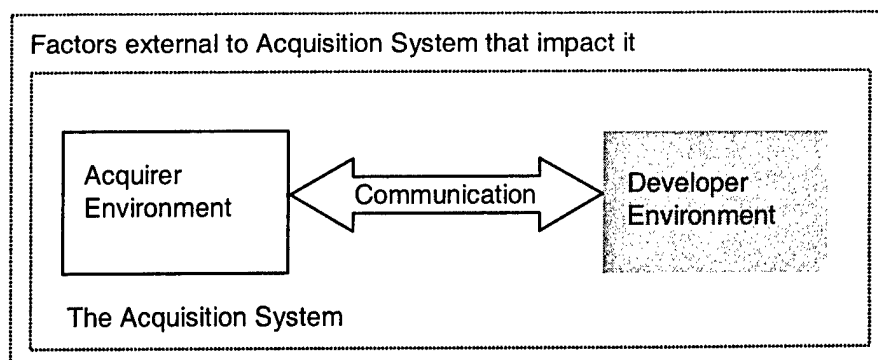
Summary

Total number	150
Strongly Agree and Agree	70%
Strongly Disagree and Disagree	12%
Don't Know or N/A	16%

7.3 The Developer Environment

Context diagram

In this section, we describe the results of survey items that focused on questions about the "Developer Environment" (shaded areas in diagram below).



Explanation

Respondents were asked to indicate their perception of the impact of the contractor's work processes on the success of their software-intensive system acquisitions.

To accomplish this, respondents rated a list of work processes by assigning one of the following to reflect how they view each of the contractor's processes: (a) Excellent, (b) Above average, (c) Average, (d) Below average, (e) Extremely Poor, (f) Don't know.

Categories that were rated

The categories that were rated by the respondents are:

- Project planning
- Project monitoring and control
- Requirements development
- Requirements management
- Measurement analysis and reporting
- Software architecture development and assessment
- Technical solution
- Product integration
- Configuration Management
- Risk management
- Verification
- Validation
- Supplier or subcontract management
- Integrated teaming
- Defined processes that support product development and stable operations
- Sharing all relevant information that you feel you should know to manage the acquisition effectively
- Causal analysis and resolution for defect prevention

How the results are presented

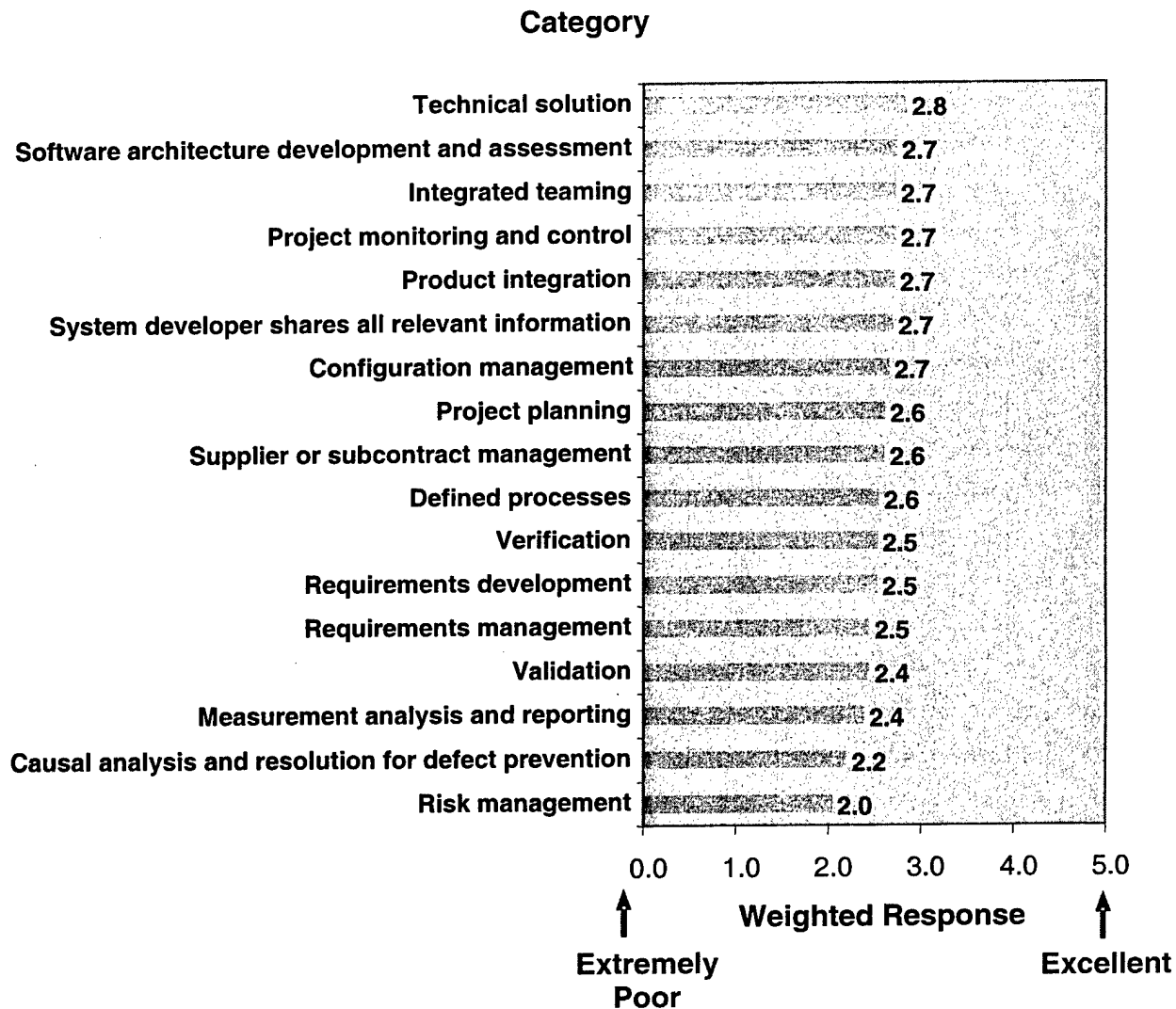
The response categories were assigned a scaled numerical value as shown in this table:

Response category	Numerical assignment
Excellent	5
Above average	3.5
Average	2.5
Below average	1
Extremely Poor	0
Don't know or didn't respond	0

The responses were summed and normalized by dividing the summed responses by the number of respondents.

The results are presented as Figure 60 on the next page.

Figure 60: Scaled rating of respondent's perception of impact of the contractor's work processes on the success of their software-intensive system acquisitions



Scale assignments for this chart :

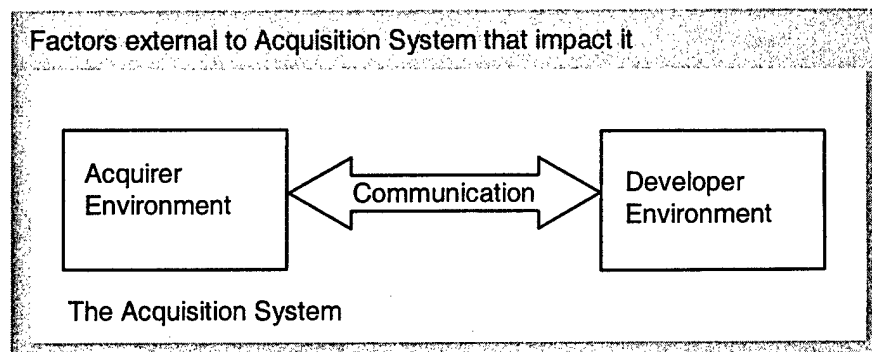
Excellent =	5
Above Average =	3.5
Average =	2.5
Below Average =	1
Extremely Poor =	0
Not Relevant or Don't Know =	0

7.4 Impact of External Factors on Acquisition

Context diagram

In this section, responses are focused on questions about factors that are perceived to be external to the acquisition system (but may impact it).

This is represented in the diagram below by the shaded area.



Synopsis

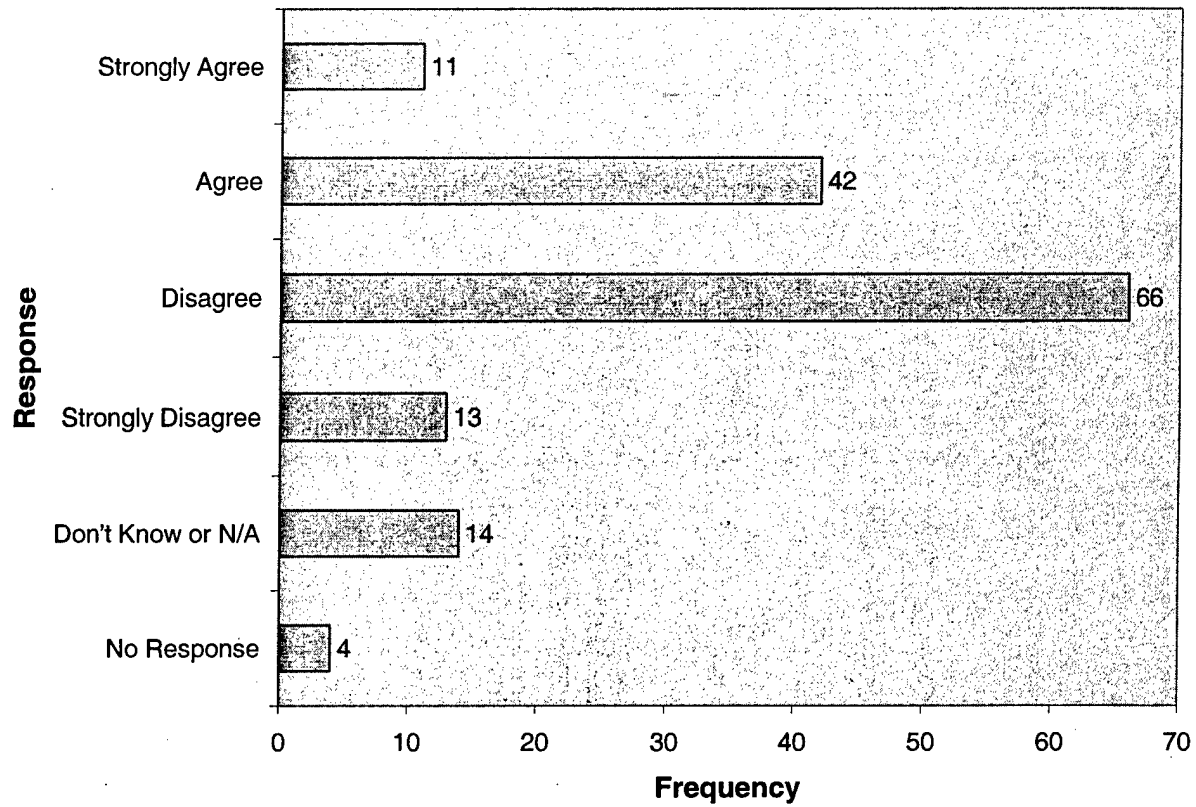
This table shows the percentage of respondents who selected "Strongly Agree" or "Agree" for their responses to survey items.

Questionnaire Item	Agree
Mandates from Congress inhibit our program from meeting its goals.	20
Reallocation of program funding is a significant source of frustration in acquisition programs.	90
Critical personnel are lost due to military rotations or inability to compete with industry salaries.	55
Acquisition reform has negatively impacted our ability to meet our objectives.	20
Expression of user requirements throughout the acquisition process causes disruption in the development process.	20
Lack of test bed assets to stress test system under realistic operational conditions is a major problem.	20

Detailed response profiles

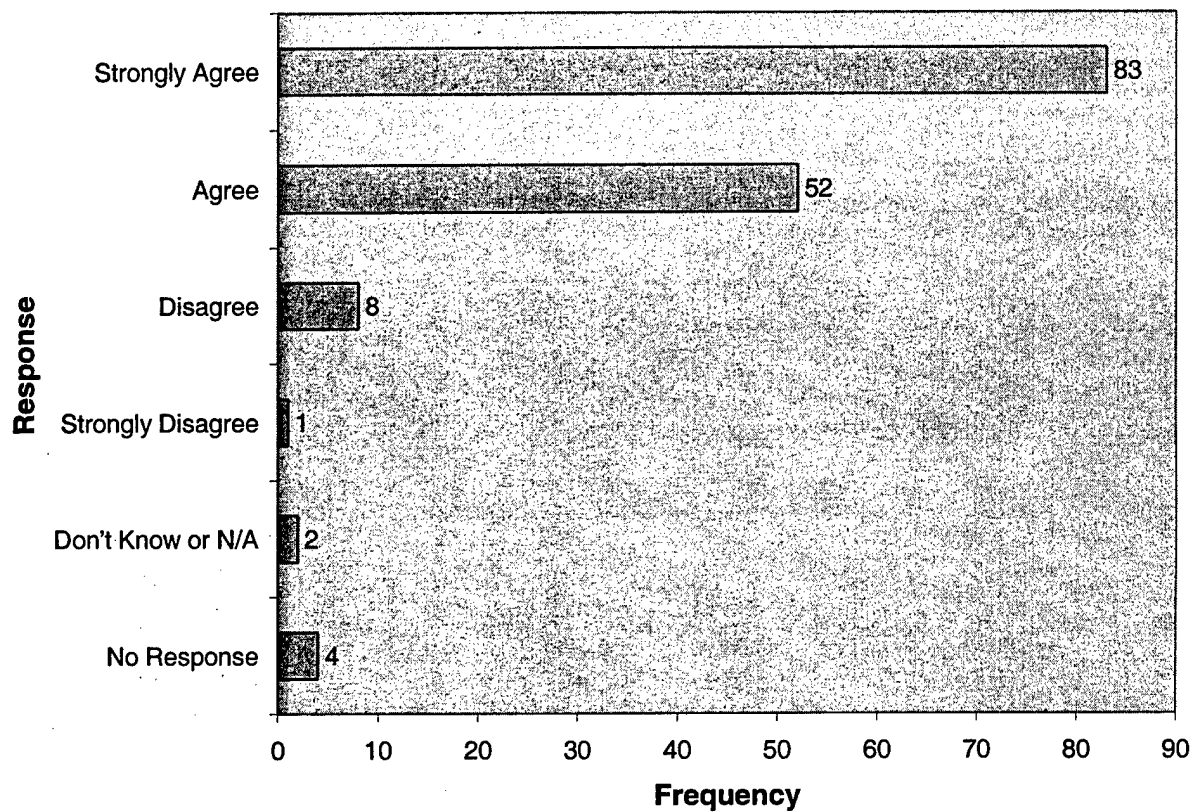
The detailed response profiles are presented on the following pages.

Figure 61: Mandates from Congress inhibit our program from meeting its goals.



Summary	Total number	150
	Strongly Agree and Agree	20%
	Strongly Disagree and Disagree	72%
	Don't Know or N/A	5%

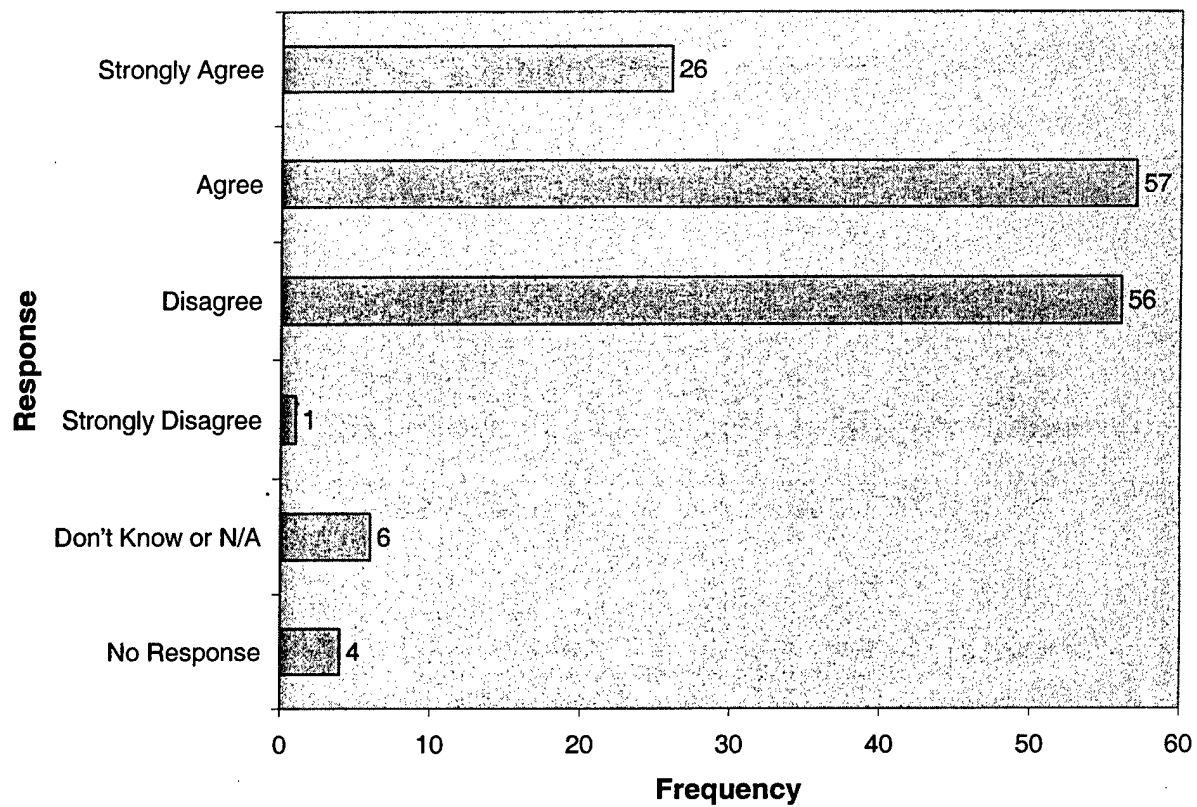
Figure 62: Reallocation of program funding is a significant source of frustration in acquisition programs.



Summary

Total number	150
Strongly Agree and Agree	90%
Strongly Disagree and Disagree	6%
Don't Know or N/A	1%

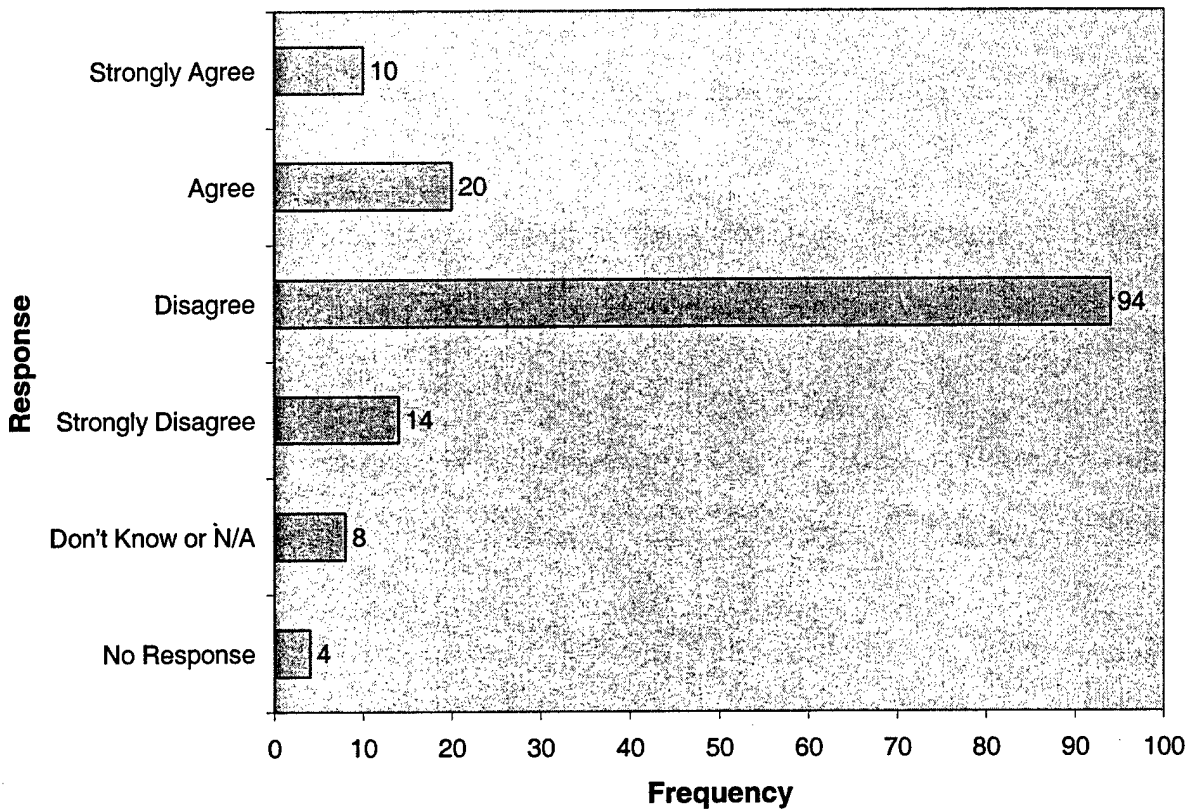
Figure 63: Critical personnel are lost due to military rotations or inability to compete with industry salaries.



Summary

Total number	150
Strongly Agree and Agree	55%
Strongly Disagree and Disagree	38%
Don't Know or N/A	4%

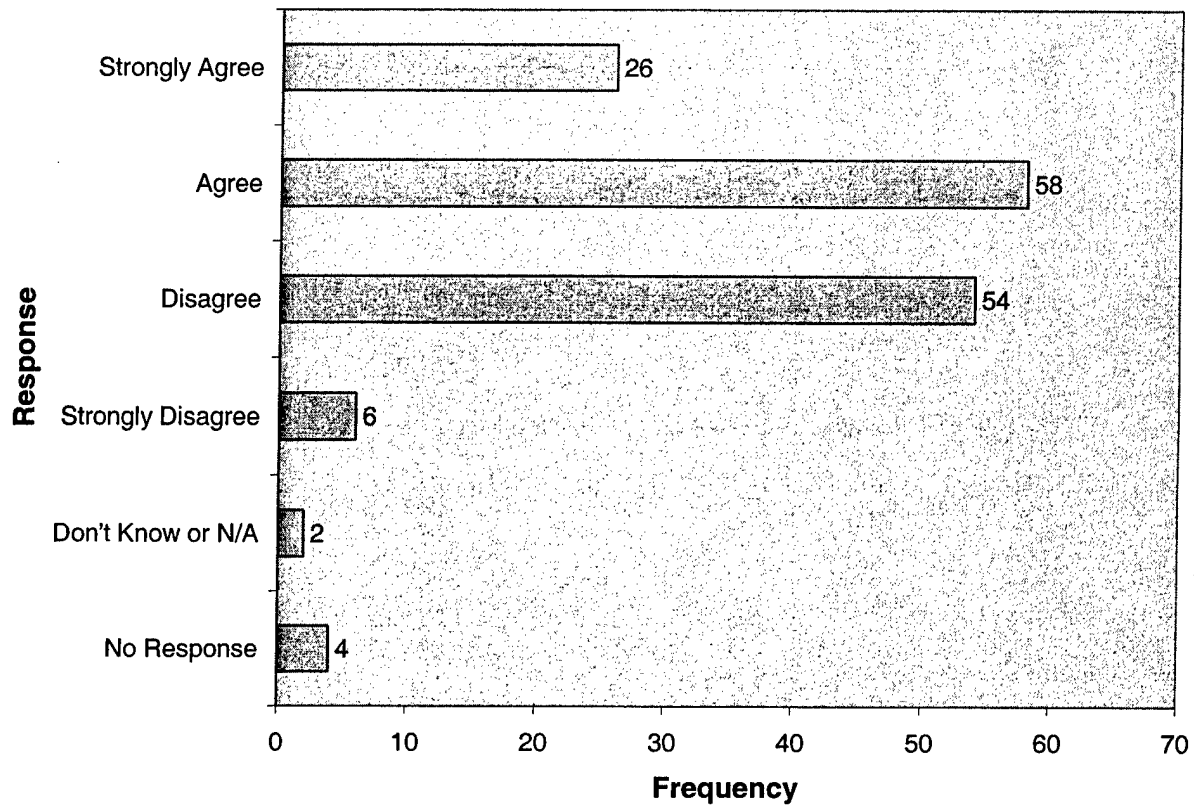
Figure 64: Acquisition reform has negatively impacted our ability to meet our objectives.



Summary

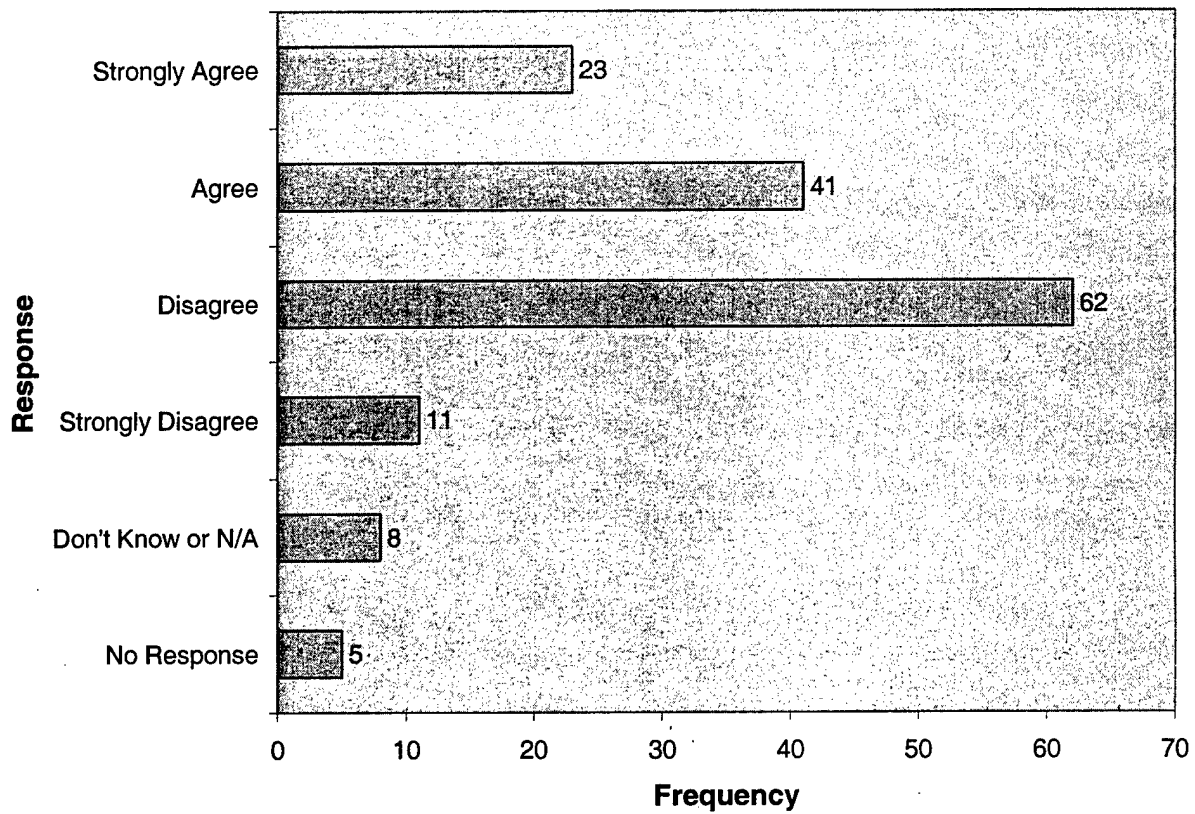
Total number	150
Strongly Agree and Agree	20%
Strongly Disagree and Disagree	72%
Don't Know or N/A	5%

Figure 65: Expression of user requirements throughout the acquisition process causes disruption in the development process.



Summary	Total number	150
	Strongly Agree and Agree	20%
	Strongly Disagree and Disagree	72%
	Don't Know or N/A	5%

Figure 66: Lack of test bed assets to stress test system under realistic operational conditions is a major problem.



Summary

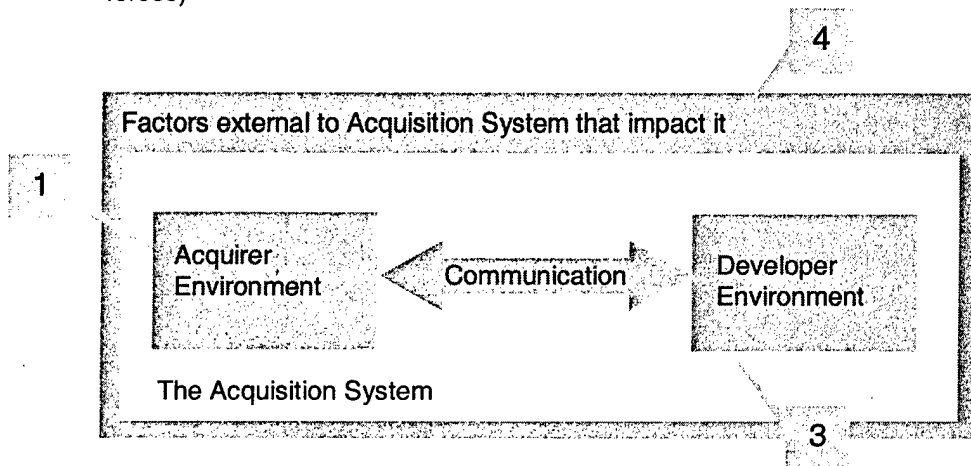
Total number	150
Strongly Agree and Agree	43%
Strongly Disagree and Disagree	49%
Don't Know or N/A	5%

7.5 Where Are the Major Problems and Risks?

Explanation

Respondents were asked to identify where they perceived the major problems and risks in their acquisition programs to be. The areas considered were listed as

1. acquisition program policies and processes
2. the contracting process between acquirers and developers
3. the contractor's (or supplier's) development process
4. factors outside the control of the acquirers and developers (e.g., congressional mandates, priorities set by engagements of our armed forces)



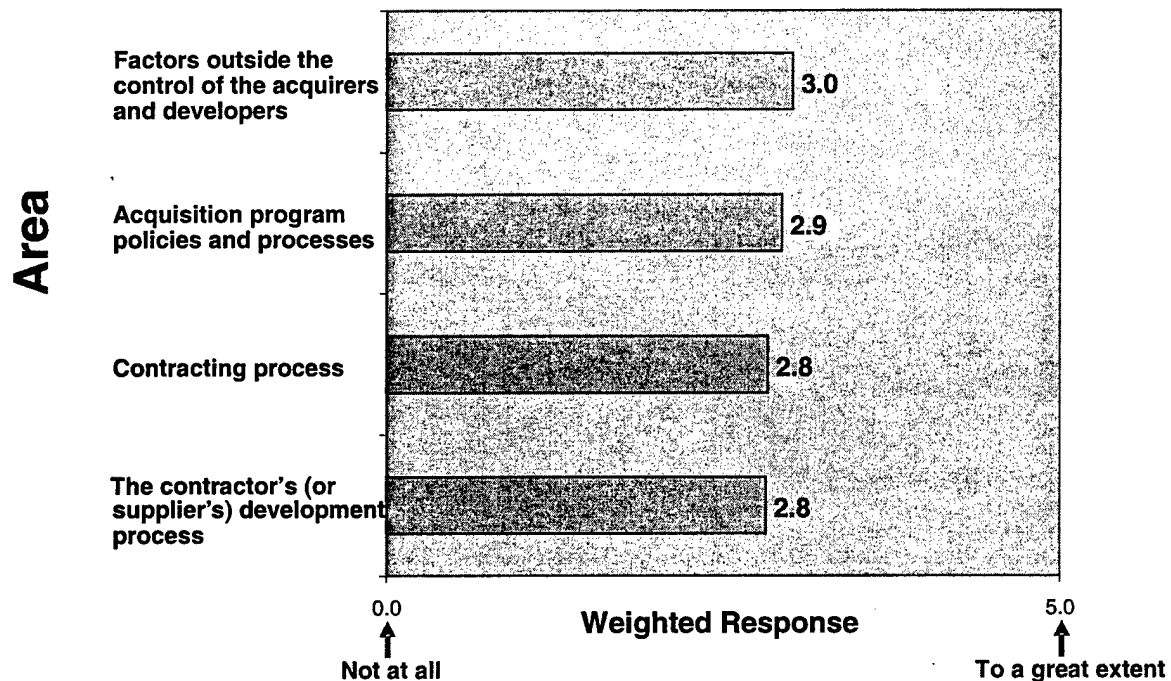
As an additional guideline for responding to this item, participants were asked to consider their cumulative experience in acquisition over the last 10 years.

Figure 67 presents a summary of the results. To portray this summary, the following numerical scale was assigned to response categories.

To a great extent	= 5	Average	= 1
Somewhat	= 3	Not at all	= 0

The response totals were summed for each of the four domain areas and then divided by the number of respondents to normalize the assigned score.

Figure 67: Weighted responses that indicate where respondents believe the majority of problems and risks (affecting their acquisition projects) reside



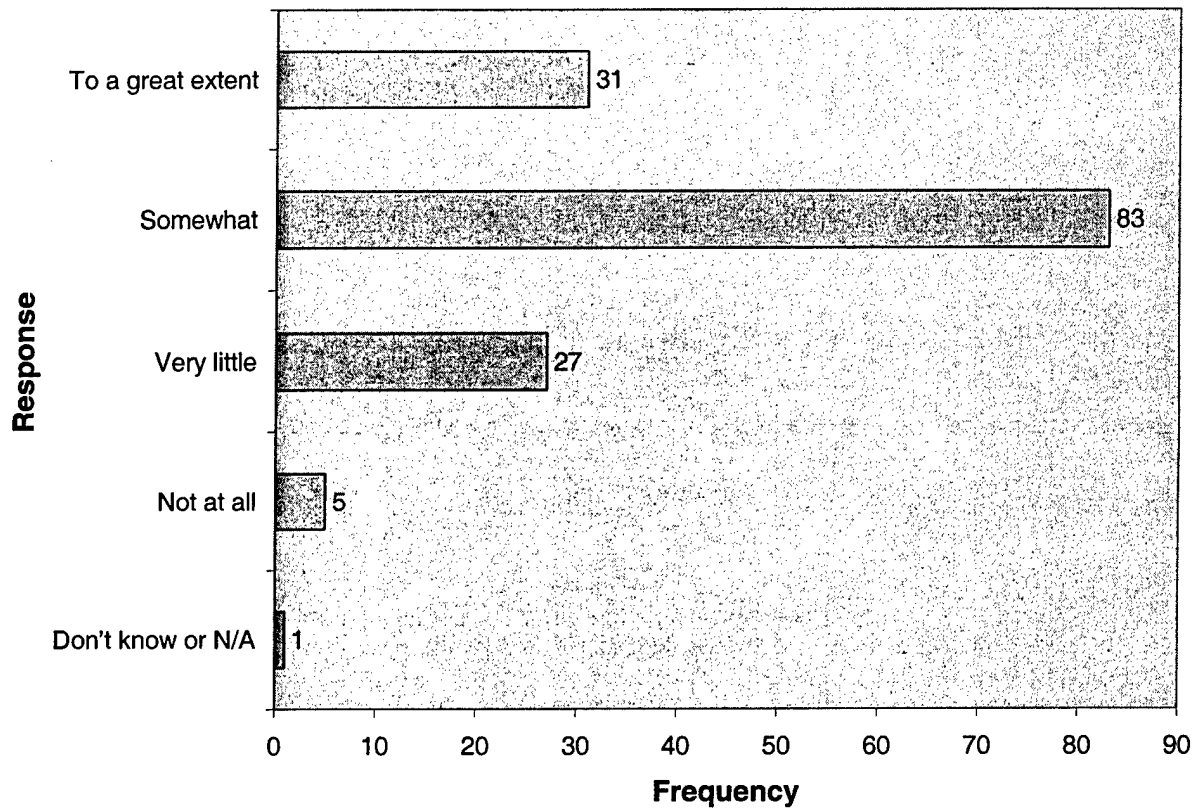
Scale Assignments for this chart:	
To a great extent =	5
Somewhat =	3
Very little =	1
Not at all =	0
Not Relevant or Don't Know =	0

Explanation For displaying the results above, the response totals were summed for each of the four domain areas, then divided by the number of respondents to normalize the assigned score.

Detailed response profiles The detailed response profiles are presented on the following pages.

7.5.1 Acquisition Programs and Policies

Figure 68: Respondents' perception of the extent to which acquisition policies and processes contribute to the major problems and risks of acquisition programs

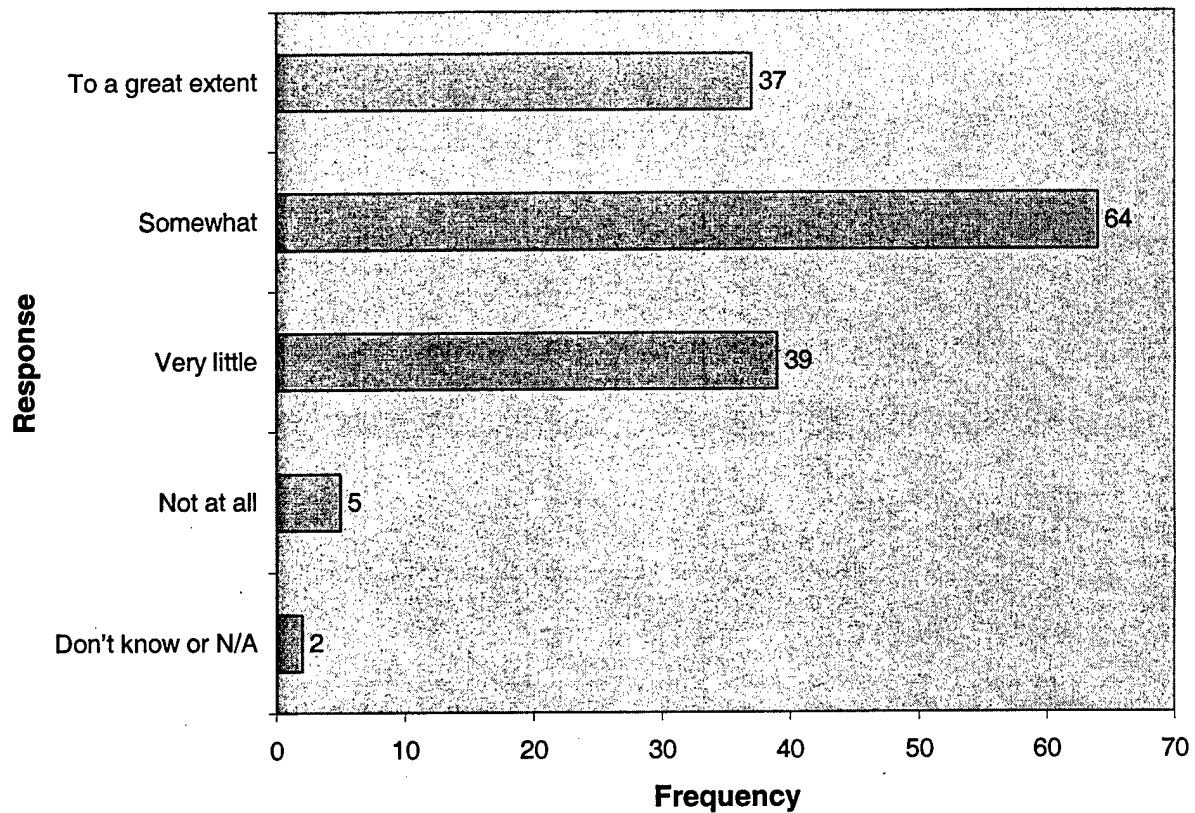


Summary

Total number	147
To a great extent	21%
Somewhat	56%
Very little	18%
Not at all	3%
Don't know or N/A	1%

7.5.2 Contracting Pocess Between Acquirer and Developer

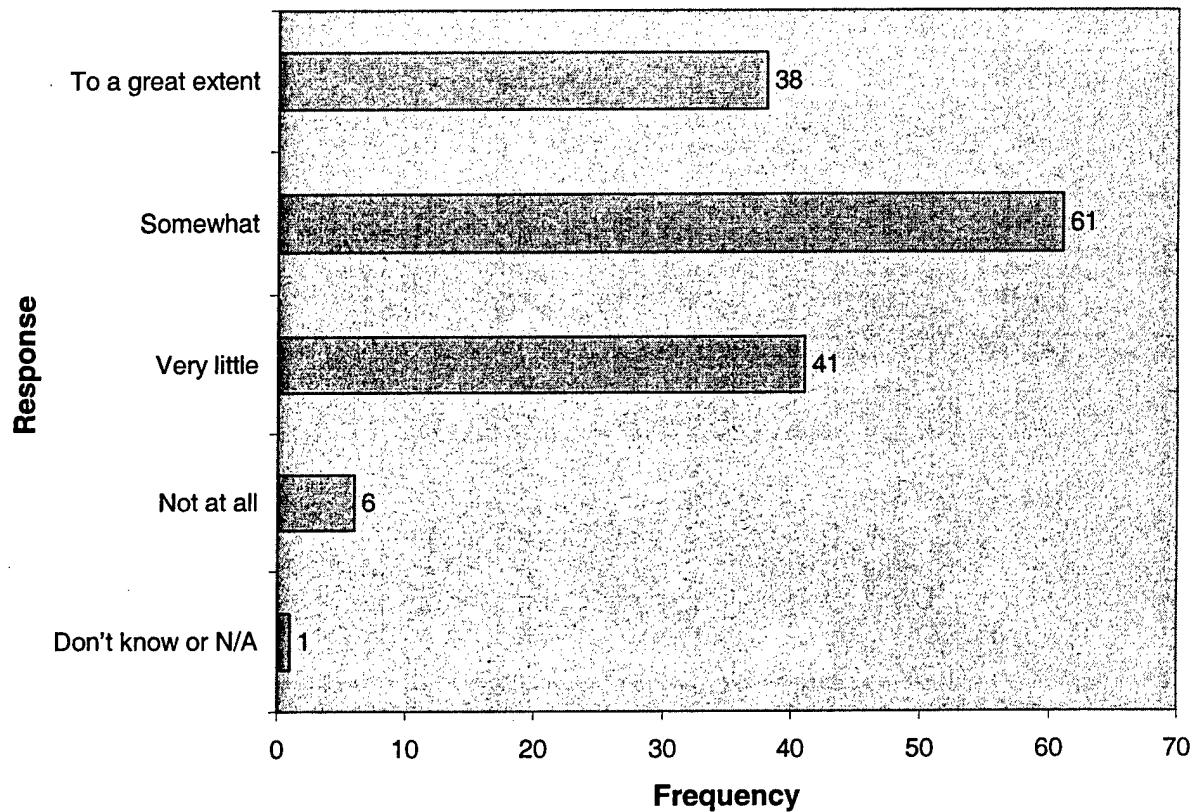
Figure 69: Respondents' perception of the extent to which the contracting process between acquirer and developer contributes to the major problems and risks of acquisition programs



Summary	Total number	147
	To a great extent	25%
	Somewhat	44%
	Very little	27%
	Not at all	3%
	Don't know or N/A	1%

7.5.3 Contractor's (or Supplier's) Development Process

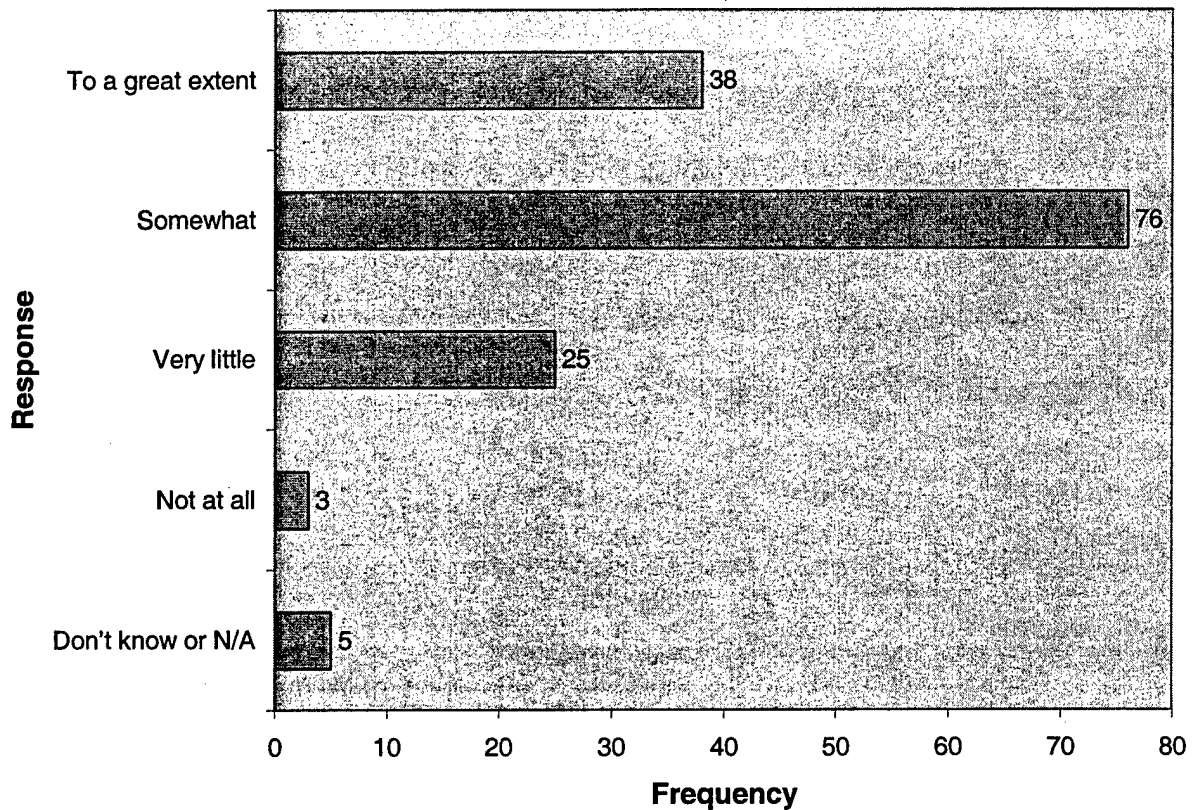
Figure 70: Respondents' perception of the extent to which the contractor's (or supplier's) development process contributes to the major problems and risks of acquisition programs



Summary	Total number	147
	To a great extent	26%
	Somewhat	41%
	Very little	28%
	Not at all	4%
	Don't know or N/A	1%

7.5.4 Factors Outside the Control of the Acquirers and Developers

Figure 71: Respondents' perception of the extent to which factors outside the control of the acquirers and developers (congressional mandates, priorities set by engagements of our armed forces, etc.) contribute to the major problems and risks of acquisition programs

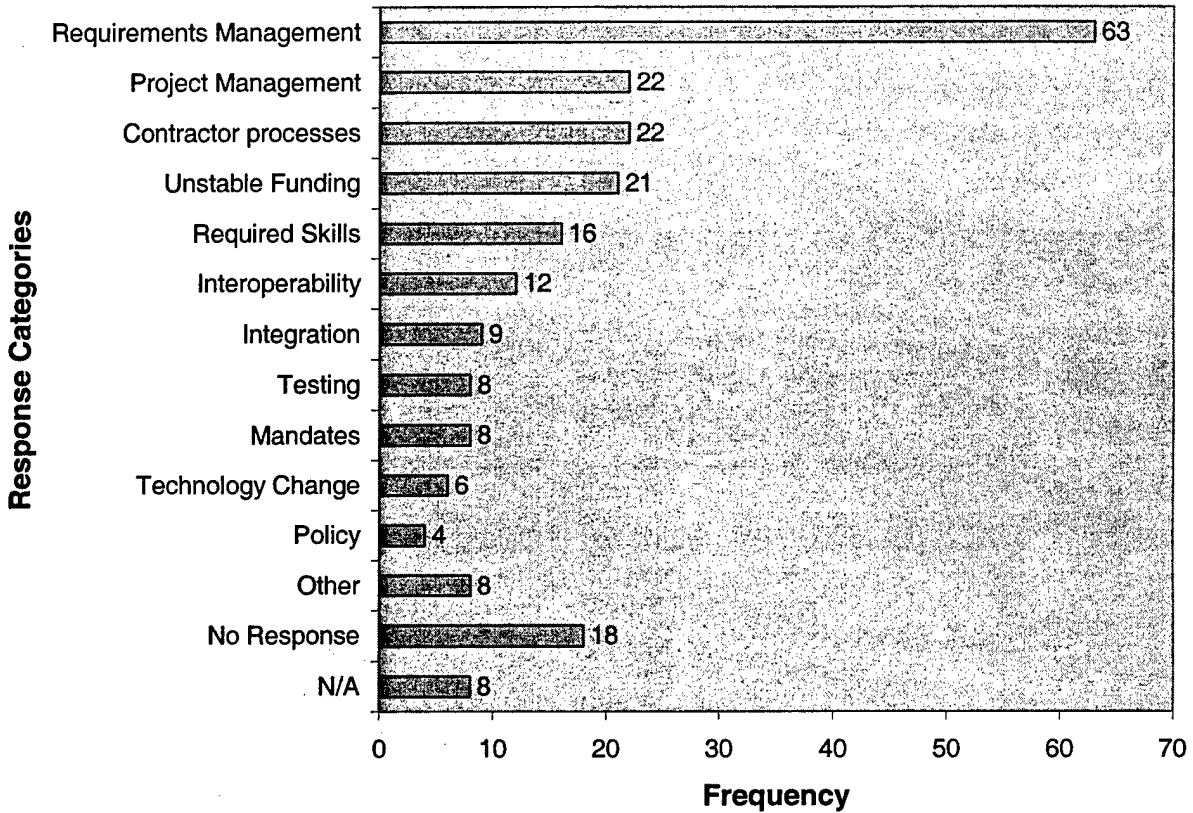


Summary	Total number	147
	To a great extent	26%
	Somewhat	52%
	Very little	17%
	Not at all	2%
	Don't know or N/A	3%

7.6 What Are the Most Difficult Problems?

Explanation	<p>The survey included two closely related, open-ended questions:</p> <p>Question 1</p> <p>Overall, what are the one or two most difficult problems that your project has faced in conducting successful acquisition of software-intensive systems? (Please describe.)</p> <p>Question 2</p> <p>If you could change one or two things about how software-intensive systems are acquired in the Army, what would they be? (Please describe.)</p>
How the results are being reported	<p>To preserve anonymity, the narrative responses are not being reported in this document.</p> <p>Question 1</p> <p>In this section, we report a summary of results from question 1 (which asked respondents to identify their one or two most difficult problems).</p> <p>Question 2</p> <p>A summary of question 2 did not lend itself well to categorical analysis. In many cases, the change being suggested was directly related to the response that the participant provided for question 1.</p>
Analysis approach to narrative responses	<p>To analyze and quantify the narrative information, we did the following:</p> <ol style="list-style-type: none">1. Categorized each response by tagging it with a key word or short phrase.2. Grouped related responses as guided by the assigned tag.3. Reviewed the results of question 2 to validate the category assignments of each response.4. Tallied the frequency of responses within each category.5. Charted the results of question 4.
Charting the results	<p>The results of the analysis are displayed in Figure 72 on the next page.</p>

Figure 72: Frequency of top two problem categories identified by respondents



Summary

Total number	225
Requirements Management	28%
Project Management	10%
Contractor processes	10%
Unstable Funding	10%
Required Skills	7%
Interoperability	5%

**Example
responses:
Requirements
Management**

Without violating the anonymity of the participants, here are some actual examples of the narrative responses provided in the survey:

- Inadequately defined requirements: As requirements changed, the new requirements were poorly defined compounding the problems.
- Unclear requirements.
- Definitive requirements identification.
- Requirements creep.
- Changing requirements/priorities.
- Defining SW requirements.
- Requirements creep due to changing user requirements.
- Requirements creep with user community - PM's must be able to hold the line to their customers on requirements, complete a product, then get the additional requirements in a follow-on product.

**Example
responses:
Project
Management**

Without violating the anonymity of the participants, here are some actual examples of the narrative responses provided in the survey:

- Software sizing and cost estimation.
- Maintaining a known budget from which to plan and execute. Unanticipated decrements, regardless of reason, continue to challenge the Program Office and developer to provide a product on time, within cost that meets all agreed to specifications.
- Sometimes very difficult to synchronize sub-component software development schedules with the end user platform software development schedules. Schedule slips have ripple effects that require intensive management to overcome.
- Under-estimation of effort.
- Inaccurate software estimate and schedule—lack of historical data from developers.
- Program schedule requirements.
- Conflicting schedules among systems that we must interface with.

8 Observations and Conclusions

Introduction

The survey results are informative and provide a needed starting point for further investigations. However, there is a risk of over-interpreting the results. For example, due to constraints beyond the control of the researchers, it was not possible to characterize the target audience sufficiently in order to design a sampling plan that would allow determination of statistical significance for the findings.

In addition, there are other threats to validity that should be considered, so that the reader can couch any conclusions about the results within a reasonable context.

Cannot generalize the results

Typically, survey research is conducted when we would like to know something about a large number of people (the *population*), but can only study a small number of them (the *sample*). In other words, the intent is to study the sample in order to make generalizations about the population.

Empirical researchers and statisticians often speak of the “validity” of a study. The validity of a study refers to the approximate truth of propositions, inferences and conclusions.

External validity refers to the approximate truth of conclusions that involve generalizations (that is, generalizations made about the population from the information generated by the sample). To generalize for a population, surveys must follow strict procedures in defining whom to study and how to select them. For example, a random sample must be drawn from a well-defined population. Doing so enhances the probability that the sample is representative of the population.

In this study, we were not able to characterize either the population or the sample in sufficient detail to allow us to make generalizations about the opinions of the population of Army acquisition managers. Respondents self-selected themselves to participate in this study and we are unable to establish if the sample was indeed representative of the population of interest. Therefore, the reader should be aware of this threat to external validity and that making generalizations based on the survey results is risky at best.

Biased responses

One source of possible inaccuracy in surveys has to do with the tendency of individuals to offer socially desirable answers in a way that conforms to dominant belief patterns.

To a large degree in this survey, program managers were being asked to report on aspects of their program management competencies. If the respondent felt that their answer would be known to their superiors, then they may have biased their response to gain approval in the eyes of people whose approval they value.

We attempted to mitigate this risk by requesting accurate information and assuring the participants that their responses would not be attributed to any

individual or organization. We hope that this was sufficient mitigation. Yet, in general, the researcher was struck by the positive way in which a majority of respondents characterized their use of effective management practices.

**Terminology
issues**

For any survey, the wrong choice of words can create any number of problems—from excessive vagueness to too much precision, from being misunderstood to not being understood at all.

To mitigate the risk of misinterpretation of terminology in our survey items, we conducted reviews with acquisition subject matter experts and members of the target population. The reviewers were specifically requested to identify any terminology that could be misinterpreted by members of the target population. The survey instrument was revised to eliminate these types of problems.

**False
respondents**

For this self-administered survey, it was not possible to verify who the actual respondent was. The intended target audience was Army acquisition program managers who are responsible for software-intensive systems. Individuals self-selected themselves for participation in this survey. It appears that in some cases, the program manager may have delegated the task of completing the survey to others in their organization. Figure 3 on page 15 indicates that 17% of those responding may not be acquisition managers.

In these cases, it is likely that the task was delegated by the program manager to those they perceived were more qualified to answer questions about the software side of acquisition. Since the purpose was really to obtain factual insight into software acquisition-related issues, having these individuals answer for their managers is not viewed here as especially problematic.

Cause and effect

In general, it would be erroneous to attribute cause and effect relationships to results obtained in this survey. Due to the broadness of issues covered in this survey and the inherent inability of surveys to delve deeply into complex issues, causal relationships could not be explored.

Further investigations would be required to establish causal relationships related to the outcomes of this survey.

8.1 Relevancy of Current DoD Acquisition-Based Initiatives

The top rated DoD initiatives

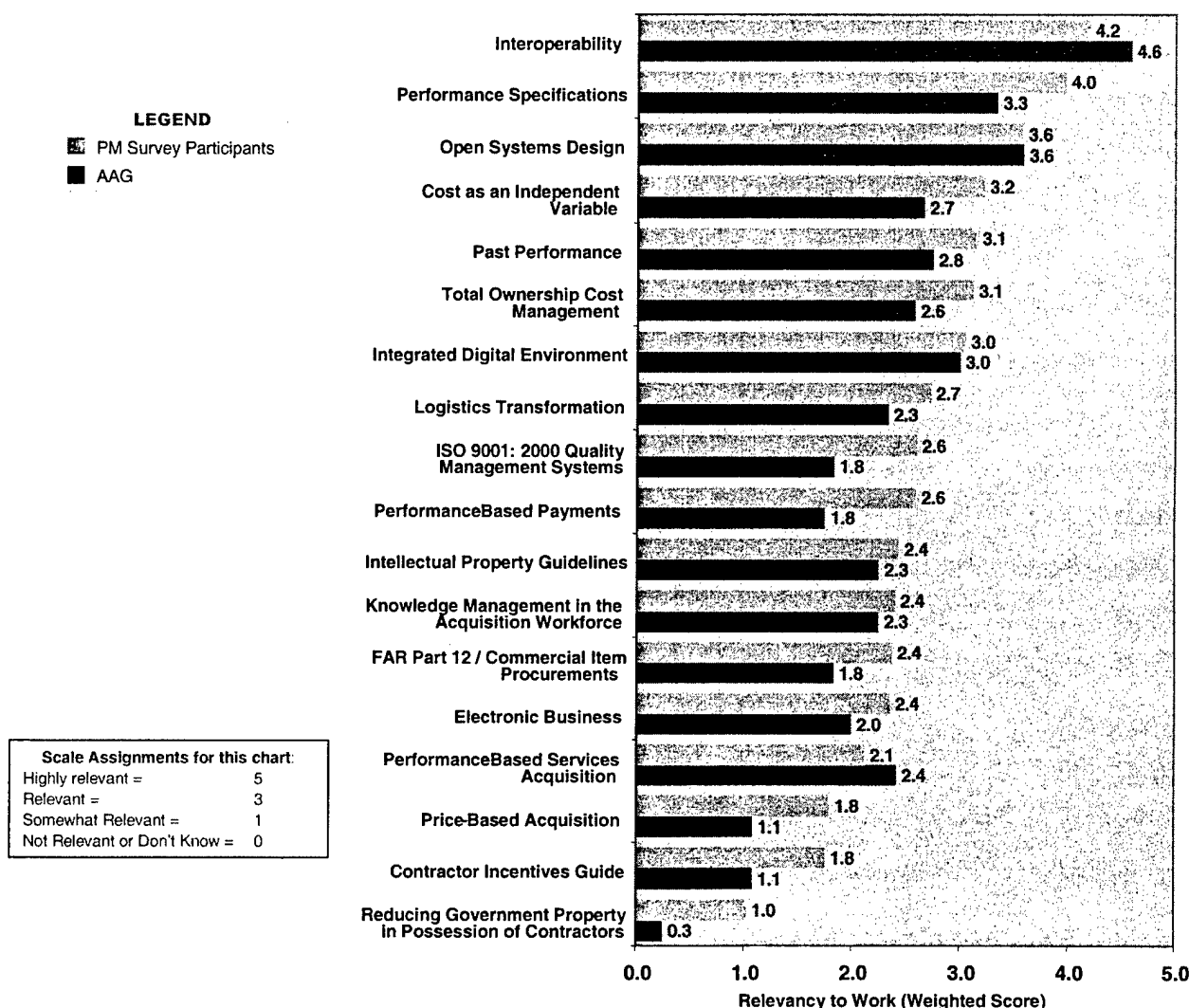
We asked respondents to rate the relevancy of current DoD acquisition-based initiatives (see Figure 16 on page 31). Out of 18 initiatives, the three highest rated were (1) interoperability, (2) performance specifications, and (3) open systems design.

In response to an open-ended question, individuals were asked to identify one or two of the most difficult problems that their project has faced in conducting successful acquisition of software-intensive systems.

Interoperability was identified in 7% of the responses. It was the 6th most-identified problem (see Figure 72 on page 101).

In December, 2002, the ASSIP Action Group (AAG) members were administered a questionnaire and asked the very same question about the relevancy of current DoD acquisition-based initiatives. They also responded that the *interoperability* initiative was the most relevant to how they perform their work.

Figure 73: Comparison of survey respondents and AAG member respondents



8.2 The Acquirer Environment and Communication

Areas investigated

There were a number of areas that were explored within the acquirer environment and communication area. The categories included

- education and training
- software acquisition planning and project management
- use of measurement to support decision making
- solicitation
- software-related contractual requirements development and management
- contract performance management
- transition to support
- transition to operations

Comment

In general, the survey items for these categories were worded in such a way that a respondent's agreement (with the survey item) would indicate that an effective practice was in use within the program.

Practices that are not broadly implemented

The following table presents the top eight survey statements that were viewed unfavorably in the sense that the stated practice is not in use within the program.

ID	Survey Item	Agree
1	Use of Measurement to Support Decision Making: Your project team records statistical and quality management data in the organization's measurement repository and uses that information for decision making.	50
2	Software Acquisition Planning and Project Management: There is a change request process for submitting suggestions for improving the acquisition process.	56
3	Solicitation: Software risks are independently evaluated as part of the solicitation and are communicated to the solicitation official.	58
4	Education and Training: You use organizational or project training plans to plan for individual training.	59
5	Software Acquisition Planning and Project Management: A novice engineer (participating on this acquisition project) would know how to surface risks according to the risk identification and analysis plan.	59

Table continues on next page

Practices that are not broadly implemented, continued

This table continues from previous page.

ID	Survey Item	Agree
6	Software-Related Contractual Requirements Development and Management: A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.	66
7	Contract Performance Management: Your project team identifies, documents, and tracks software risks associated with the contractor's efforts, independent of the contractor's risk management process.	67
8	Transition to Support: The strategy for transition into maintenance is documented, communicated, and agreed to by all parties early in the acquisition.	66

Of the items listed in the table above, the following are of interest:

- Three of the top eight items above (IDs 3, 5, and 7) are related to the use of risk management procedures.[†]
- Two of the items (IDs 5 and 6) include the term "novice engineer" as part of the conditions associated with implementation of the practice. Only three items in the entire survey used this term.

The use of this term may have affected how individuals responded to this question. It might imply that the practice is not well-enough documented so that a new employee could be apprised of how this practice is implemented. If the term was not included, one might speculate that the percentage in agreement (with the statement) may have been higher.

- It is not surprising that many respondents did not agree with item ID 1 in the table. This item refers to the use of quantitative measures for decision support and the use of an organizational measurement repository. What is surprising is that 50% of the respondents stated that they do use such mechanisms. Use of such processes and mechanisms are typically associated with a very disciplined organization with mature processes.

[†] It should also be noted that of 42 items addressed in this section (that is, "The Acquirer Environment and Communication"), 8 of those items addressed aspects of risk management.

* For example, these types of effective practices are associated with Levels 4 and 5 of the Software Acquisition Capability Maturity Model[®] (SA-CMM[®]) (CMU/SEI-2002-TR-010).

Comparing topical categories

In the table below, the survey item category is listed on the left. To the right are three columns that list the

- lowest percent (of respondents) agreeing with any single survey item from that category;
- average percent of respondents in agreement with all survey items from a category; and the
- highest percent (of respondents) that agree with any single survey item in that category.

	Percent that agree w/ survey items		
	Low	Average	High
Education and training	59	75	88
Software acquisition planning and project management	56	76	87
Use of measurement to support decision making	50	73	83
Solicitation	58	67	80
Software-related contractual requirements development and management	66	75	79
Contract performance management	67	77	86
Transition to support	66	69	70
Transition to operations	70	80	85

These values can be used to conduct a crude comparison of how respondents reacted to questions from one category to the next. However, this *comparison must be done with caution*, since it is impossible to draw specific conclusions without inspecting the wording of specific survey items in each of the categories.

If one looks across the categories of survey items, it is noted that *Solicitation* was the category that appeared to have the most unfavorable responses on average (in terms of the indicated practices being implemented). The questions within "Transition to support" also indicate a lower agreement level when compared to the other categories of survey items.

While the results of this analysis are by no means conclusive, they do point to areas that should be investigated in more depth to expose potential high-impact improvement opportunities.

Use of measurement

Respondents were asked to identify whether they were using measurement to track program status and progress. The table below is reproduced from chapter 7, Overview of Survey Results.

Measure	Percent using
Requirements stability	51
Manpower	63
Development progress	82
Cost	86
Schedule	91

It is interesting to note that, in particular, a large percentage of managers are not tracking requirements stability.

This result is noted in relation to a different question posed to participants. When respondents were asked to identify the two most problematic areas that they must contend with, requirements management was identified as the top item.[†] (See Figure 72 on page 101.)

Perhaps the lack of measurement and tracking of requirements is part of the requirements stability problem. If measures are used to obtain a better understanding of the issues related to requirements stability, then this could lead to identification of appropriate improvement strategies.

With respect to the other measures reported above, it is surprising that such high proportions of the respondents are *not* tracking such fundamental project characteristics as schedule and cost.

[†] In response to an open-ended question regarding the top two problems faced by program managers, 28% of the responses identified requirements management. Project management (10%) and contractor's processes (10%) were the other top problems identified.

Requirements management

In this section of the survey, seven close-ended questions addressed aspects of requirements management. In general, the response pattern was rather normal when compared to responses from other categories. Exceptions included responses to the following questions:

Survey Item	% Agree
The software-related contractual requirements baseline is established prior to release of the solicitation package.	51
A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.	63

When responding to the open-ended question regarding the two top problems that the respondent encounters in acquisition, requirements management was identified most often as the top problem encountered.

Project management processes

When responding to the close-ended survey items that addressed program planning and project management, respondents seemed to indicate that these processes were generally implemented in a sufficient way (see page 42).

Yet, when asked to identify the top two problems that they faced, a large number of responses were associated with project management. Project management was identified in 10% of the open-ended responses (see page 101).

This may or may not present an inconsistency. One possibility is that the close-ended questions did not address the project management concerns of managers. Another possibility is that although the close-ended response profile didn't show major irregularities, perhaps the managers who responded that they don't apply effective practices are reflecting (in their open-ended responses) that these are significant problems for their program.

* Two requirements management related close-ended questions were in the "Solicitation" category and five questions were in the Software Related Contractual Requirements Development and Management category.

8.3 The Developer's Environment

Rating the developer's processes

Respondents were asked to rate the system developer's abilities in a number of key process areas. The scaled results are presented graphically in Figure 60 and reproduced in table form below. The scale assignments were defined as follows:

Excellent	= 5	Below Average	= 1
Above Average	= 3.5	Extremely Poor	= 0
Average	= 2.5	Not relevant or don't know	= 0

System Developer's Processes	Rating
Technical solution	2.8
Project monitoring and control	2.7
Software architecture development and assessment	2.7
Product integration	2.7
Configuration management	2.7
Integrated teaming	2.7
Sharing all relevant information that you feel you should know to manage the acquisition effectively	2.7
Project planning	2.6
Supplier or subcontract management	2.6
Defined processes that support product development and stable operations	2.6
Requirements development	2.5
Requirements management	2.5
Verification	2.5
Measurement analysis and reporting	2.4
Validation	2.4
Causal analysis and resolution for defect prevention	2.2
Risk management	2.0

When rating the system developer's processes, acquisition managers (who responded) seem to perceive that performance is average on a scale from excellent (5) to extremely poor (0). Whether these perceptions are based on first-hand knowledge or through other means is unknown to the researcher.

It is interesting to note that performance was rated lowest for risk management. This is an area in which a proportion of respondents have implied deficiencies on their own part (see page 106).

8.4 Impact of External Factors on Acquisition

Key results

Six close-ended survey items addressed the impact of external factors on the success of the respondent's acquisition process. The results are presented in Figures 61-66 beginning on page 88.

In particular, the responses from two questions in this section of the survey draw special attention. They appear below, and the right column shows the percent of respondents who agreed with the statement.

Survey Item	% Agree
Reallocation of program funding is a significant source of frustration in acquisition programs.	90
Critical personnel are lost due to military rotations or inability to compete with industry salaries.	55

Note that 90% of the respondents feel that reallocation of program funding is a significant source of frustration. Ninety percent agreement (for a survey item) is the highest level of agreement among the respondents being reported as part of these results.

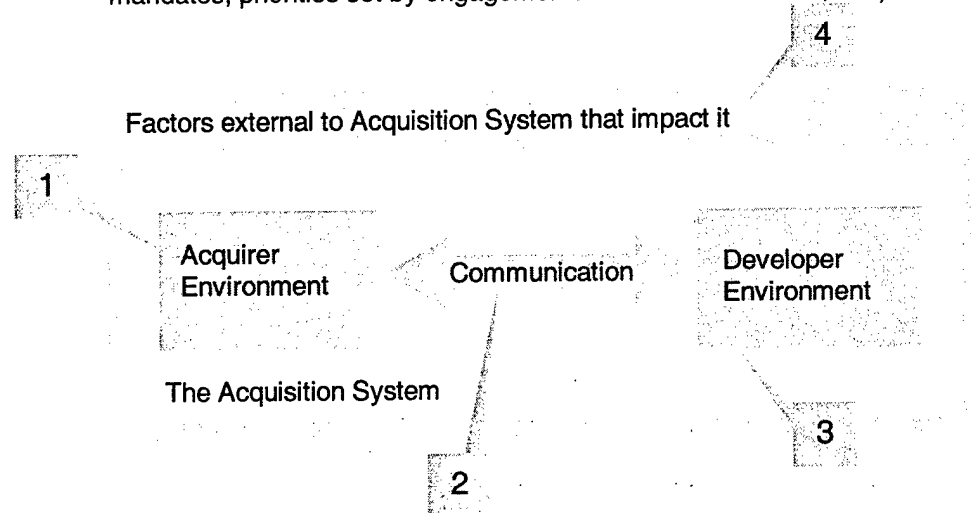
Fifty-five percent or nearly half of the respondents believe that personnel turnover may be a source of problems in their acquisition environment.

8.4.1 Where and What Are the Major Problems and Risks

Where?

Respondents were asked to identify *where* they perceived the major problems and risks in their acquisition programs to be. The areas considered are

1. acquisition program policies and processes
2. the contracting process between acquirers and developers
3. the contractor's (or supplier's) development process
4. factors outside the control of the acquirers and developers (congressional mandates, priorities set by engagements of our armed forces, etc.)



For each of the four areas, respondents were asked to indicate the degree to which problems and risks can be attributed to an area in the following way:

- To a great extent (5)
- Somewhat (3)
- Very little (1)
- Not at all (0)

The results are presented in Figures 67-71. A summary is presented in tabular form below.

Survey Item	Score
Acquirer processes	2.9
Communication	2.8
Developer processes	2.8
Factors external to acquisition system that impact it	3.0

The results are quite similar for each area (2.8-3.0). In addition, the response profiles for each area (Figures 68-71) are remarkably similar. As a whole, respondents believe that major problems and risks are only somewhat attributable to a specific area.

What?

Respondents were asked to identify *what* they perceived as the major problems and risks in their acquisition programs. The following open-ended question was included in the survey:

Overall, what are the one or two most difficult problems that your project has faced in conducting successful acquisition of software-intensive systems? (Please describe)

The open-ended responses were classified by recurring themes using an adaptation of the affinity grouping technique.

The results are reported in Figure 72 and a summary of the results is reproduced below.

Summary	Total number of responses	225
	Requirements management	28%
	Project management	10%
	Contractor processes	10%
	Unstable funding	10%
	Required skills	7%
	Interoperability	5%

Requirements Management

Requirements management was most often identified as a major problem and risk area. This result is consistent with responses from the following close-ended survey items:

Survey Item	% Agree
The software-related contractual requirements baseline is established prior to release of the solicitation package.	51
A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.	63

Such low agreement percentages for these statements seem to validate the notion that requirements management represents a potential high-impact area for future improvement activities.

**Project
Management**

Ten percent of the responses suggested that project management was the source of most problems and risks.

In response to close-ended survey items addressing project management, the data indicates that a rather large majority (approximately 80%) of respondents feel that effective practices *are* being used (see page 39).

One might conjecture that for those who *do* have project management issues, they represent a significant obstacle to accomplishing successful acquisition projects.

**Contractor
processes**

Ten percent of the responses identified contractor processes as a major problem or risk area. When asked to rate the contractor's technical processes, the respondents reported that the overall performance was close to average (on a scale from "excellent" to "very poor"). (See Figure 60 on page 86.)

As with the project management area, this may indicate that for the proportion of respondents who *did* report a problem or issue with contractor processes, they believe that it impacts them in a significant way.

**Unstable
funding**

Ten percent of the responses identified unstable funding as a major problem or risk area.

It is not a surprise that this issue showed up in the top 5 issues reported by the participants in response to this open-ended question. Ninety percent of respondents indicated agreement with this statement:

Reallocation of program funding is a significant source of frustration in acquisition programs.

This appears to be an issue for many Army acquisition managers.

**Required
skills**

Required skills was identified as a problem/risk issue in 7% of the responses.

When examining the actual statements that were reported, the issue is that there is an insufficient number of people with *expertise in software engineering*.

Also, 55% of respondents indicated that *critical personnel are lost* due to military rotations or the inability of the acquisition organization to compete with industry salaries.

Interoperability

Five percent of the responses identified interoperability as a major problem or risk area. This is not surprising given that it is a well-known challenge area across the services.

Among current DoD acquisition-based initiatives, interoperability was identified as the most relevant initiative to how respondents perform their work. See Figure 16 on page 31.

9 Major Themes

Introduction

In this chapter, the major improvement priority themes are summarized from chapter 8 on page 103.

Primary Theme: Requirements Management

Based on the results of this survey,[†] *requirements management* is a primary theme. Evidence of this includes the following:

- This area was identified most often as the cause of the majority of problems and risks to project managers (see Figure 72 on page 101).
- Responses to two close-ended questions indicated issues with this area (see the "Requirements management" heading in section 8.2).
- Approximately 50% of respondents report that they do *not* track requirements stability (see the "Use of measurement" heading in section 8.2).

A large proportion of the respondents clearly indicate that this area is problematic for them.

Secondary themes

In addition to requirements management, there was evidence that additional areas should be more thoroughly investigated as potential areas for improvement interventions. These areas include

- unstable funding
- risk management
- interoperability
- solicitation
- transition to support
- project management
- required skills

The basis for identifying these areas as secondary themes is presented on the next page.

[†] It has already been stated in this report that the results of this survey cannot be generalized to the overall population of Army acquisition managers who are responsible for software intensive systems. See chapter 10 on page 119 for a discussion of validity issues and interpretation guidelines for the information presented in this report.

**Evidence:
Secondary
Themes**

The basis for selecting the secondary themes is listed below.

Unstable Funding

- Ninety percent of respondents agree that this area is a source of frustration (see section 8.4 on page 112).
- One of the top five problems/risks identified by respondents (see section 8.4.1 on page 113).

Risk Management

- Three of the top eight survey items that were identified as practices *not* implemented were associated with risk management (see "Practices that are not broadly implemented" in section 8.2 which begins on page 106).
- Risk management was perceived as the weakest technical process of developers (see section 8.3 on page 111).

Interoperability

- Identified as the most relevant among all other current DoD acquisition-based initiatives (see Figure 16 on page 31).
- Identified as one of the top five problems/risks identified by respondents (see "What" in section 8.4.1 which begins on page 113).

Solicitation

- When comparing responses to categories of survey items, solicitation was the category that appeared to have the most unfavorable responses on average (see "Comparing topical categories" in section 8.2 which begins on page 106).

Transition to Support

- When comparing responses between categories of questions, transition to support was a category that appeared to also have the most unfavorable responses on average (see "Comparing topical categories" in section 8.2 which begins on page 106).

Project Management

- This area was identified in 10% of responses as a major problem/risk area (see "What" in section 8.4.1 which begins on page 113). But responses to close-ended questions in this area didn't provide strong validation that project management represents a pervasive problem in the Army Acquisition System.

Required skills

- Identified as one of the top five problems/risks identified by respondents (see "What" in section 8.4.1 which begins on page 113).
- Fifty-five percent of respondents state that turnover of critical personnel is an issue (see section 8.4 on page 112).

10 Summary

Limitations of surveys

Survey data is always somewhat superficial. It is not possible to go into great detail or address complicated questions. Surveys are not capable of digging deeply into people's psyches looking for fundamental explanations of their unique understandings or behaviors. (This was especially the case for this survey, which investigated a broad set of issues spanning the Army acquisition system.)

For these reasons and others that have been addressed in this paper,[†] the reader should be careful not to over-interpret the results reported in this paper.

This survey should be considered a single data point in an overall information-gathering approach that includes multiple on-site interviews at Army acquisition program sites. The ASSIP strategy is to triangulate from these multiple data-gathering approaches to paint a more reliable picture of the key characteristics of the system. Up to 10 in-depth on-site interviews are planned for fiscal year 2004.

Themes

Major themes have been identified based on synthesizing the information from this survey. These themes are defined in rather broad terms chapter 9. These themes should be considered areas requiring more detailed investigation as potential areas for improvement interventions.

Benefits

The information obtained in this survey provides an important foundation for future data-gathering events. We *did* obtain very useful information.

The results will significantly enhance our ability to home in on key areas of interest that should be the focus of future, detailed, information-gathering events. As the layers of the acquisition system are peeled back, we will get closer to the root causes of the problem areas that have been identified here at a thematic level.

Next steps

The survey results will be used to inform the data-gathering objectives of the depth interviews to be conducted at Army acquisition sites during fiscal year 2004.

The information obtained from this survey will be combined with the outcomes of the depth interviews, and the triangulated results will be synthesized.

The ASSIP plan envisions future surveys as a way to continually expand our understanding of the state of the Army Acquisition System. Information from these surveys (as well as the depth interviews) will lead to a progressively more detailed and well-understood depiction of the Army Acquisition System so that high-impact improvement interventions can be planned effectively.

[†] See page 100-101.

**Feedback or
questions**

Please direct any feedback or questions about this document to

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Appendix – Survey Questionnaire

In this section

The survey questionnaire instrument is presented in this appendix, starting on the next page.

This is the paper form of the questionnaire that was used by several respondents who were unable to access the survey instrument over the Internet via the World Wide Web.

Army Strategic Software Improvement Program (ASSIP)

Survey of Program Managers

- Call to action** Any effective drive begins with effective intelligence about the real context of the overall engagement. For this reason, it is our intention that this improvement initiative begin with a capture of the reality of your real work environment.
- This survey is the first step in a process that will result in changes to *your* environment. Our effectiveness in acquiring an accurate picture of the real issues in Army acquisition is dependent on your careful participation in this survey.
- Therefore, please complete this survey according to the instructions at your earliest convenience.
- Complete by** Please complete this survey by 7 April 2003. We have an ambitious schedule for our improvement effort and your cooperation in this regard is vital to our success.
- Confidentiality** Your answers will be held in the strictest of confidence. Information that can identify you and your organization will be used for administrative purposes of this effort only. Your answers will be used in summary statistical form. Specific answers will never be identified by organization or individual.
- Purpose** This survey includes questions about your experiences in acquiring software-intensive systems for the Army. The results of this survey will be used to formulate plans for improving the acquisition system. Results from the survey will be used as a means of gaining insight into the processes of acquisition. The insights will then be used to identify high-leverage points of entry for improvement activities to follow from the analysis of survey results.
- Background** The Army Strategic Software Improvement Program (ASSIP) was initiated by the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)), Mr. C. Bolton, as a mechanism for improving the acquisition of Software Intensive Systems (SIS).
- One of the major goals of the ASSIP for FY 03 is to develop a Strategic Software Improvement Master Plan (SSIMP). In order to execute the ASSIP and develop the SSIMP, the ASSIP establishes a Senior Steering Group (SSG), made up of PEOs and separate reporting PMs and a supporting ASSIP Action Group (AAG), made up of representatives of the SSG Members. The Software Engineering Institute (SEI) has been selected to assist in the evolution and execution of the ASSIP and to participate in support of both established bodies.

ASSIP

Survey of Program Managers

About you and your acquisition project

1.1. Please indicate the role that best describes your position or check "other" and list the position.

- ☐ Program[†] Executive Officer (PEO)
- ☐ Program Manager of an acquisition program
- ☐ Project or Product Manager
- ☐ Deputy Program Manager for an acquisition program
- ☐ Other (please describe)

1.2. Please indicate the selection that best describes your classification.

Military

- ☐ Major General
- ☐ Brigadier General
- ☐ Colonel
- ☐ LTC
- ☐ Other (please describe)

Civilian

- ☐ SES
- ☐ GS 14 – 15
- ☐ GS 13
- ☐ GS 9 – 12

1.3. Years of experience working as an Army Acquisition Manager:

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ Over 10 years

1.4. Years of experience in current position:

- ☐ 0-2 years
- ☐ 3-5 years
- ☐ 6-10 years
- ☐ Over 10 years

1.5. How would you describe your level of personal expertise in each of the areas below?

	Extensive	Substantial	Moderate	Little if any
Acquisition program/project management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Software acquisition management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Software engineering technical practices (e.g., requirements management, design, configuration control, coding, testing, etc.)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Systems Engineering	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

[†] In this survey, when we use the term *program manager*, we mean program, project or product manager or project director.

1.6. Indicate the number of programs in each Acquisition Category (ACAT) that you are currently responsible for.

	Number of Programs				
	0	1	2	3-5	>5
ACAT I	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ACAT II	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ACAT III	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

1.7. Indicate the number of each type of software-intensive system that you are currently responsible for by checking the appropriate box in each row of the table.

	Number of Systems				
	0	1	2	3-5	>5
Automated Information Systems For example, management information systems supporting business operations such as payroll, inventory, or logistics.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weapons Systems For example, systems with real-time process control or guidance systems for avionics or radar; embedded software running in electronic devices, vehicles, missiles or aircraft.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C³IEW or C4ISR For example, decision support systems, intelligence systems, mission planning, communications systems, or maneuver control.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other For example, modeling and simulation, compilers, configuration management tools, cost estimation tools, personal computer applications, pattern recognition, expert systems.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

About Your Acquisition Project

DoD Acquisition-Based Initiatives

10. The DoD has implemented the major acquisition-based initiatives identified below. Please indicate your perception of the relevance of these initiatives to how you perform your work.

		Highly relevant	Relevant	Somewhat relevant	Not relevant	Don't know or N/A
10.1	Performance-based Payments	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.2	Price-based Acquisition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.3	Performance-based Services Acquisition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.4	Interoperability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.5	Cost As An Independent Variable	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.6	Electronic Business	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.7	Knowledge Management In The Acquisition Workforce	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.8	Past Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.9	Performance Specifications	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.10	FAR Part 12 / Commercial Item Procurements	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.11	Total Ownership Cost Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.12	ISO 9001: 2000 Quality Management Systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.13	Open Systems Design	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.14	Integrated Digital Environment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.15	Logistics Transformation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.16	Contractor Incentives Guide	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.17	Reducing Government Property in Possession of Contractors	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10.18	Intellectual Property Guidelines	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Education and Training

11. The following items address whether your *organization* and *project team* develop the skills and knowledge of individuals so they can perform their software acquisition roles effectively and efficiently.

- 11.1 Training that is required for the project teams to achieve their software acquisition objectives is identified and provided.
- 11.2 You know who to contact when you have training needs from the organization.
- 11.3 There are mechanisms in place that allow you to provide feedback with regard to the effectiveness of training.
- 11.4 You use organizational or project training plans to plan for individual training.
- 11.5 In general, you feel there are ample training opportunities available to ensure that project staff have the right skills to perform their jobs.

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Software Acquisition Planning & Project Management

12. The following items address whether software acquisition planning is conducted in a way that is useful and efficient for the program.

Indicate the most appropriate response to each of the following statements.

		Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
12.1	Software experts participate in system acquisition planning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.2	Acquisition plans are revised when major changes occur.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.3	Project-wide participation in the identification and mitigation of risks is encouraged and valued by management.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.4	Your acquisition project assesses the likelihood and consequence of each risk and monitors the status of each risk item.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.5	A novice engineer (participating on this acquisition project) would know how to surface risks according to the risk identification and analysis plan.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.6	Weekly or biweekly status checks or other periodic reviews are held to manage and control risks, issues and problems discovered during the software acquisition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.7	If a novice engineer discovers a problem or risk in the system design, I am confident that they would know what to do to surface that issue.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.8	There is a well-understood and effective process for resolving issues among all project functions.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12.9	There is a change request process for submitting suggestions for improving the acquisition process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Use of Measurement to Support Decision-Making

13. The following items address whether your *project* uses measurement to quantitatively control the project's performance. Indicate the most appropriate response to each of the following statements.

- | | Strongly Agree | Agree | Disagree | Strongly Disagree | Don't know or N/A |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 13.1 Planning estimates are based on historical measurement data from previous acquisition projects. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.2 Measurement-based objectives for the acquired products and services are defined. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.3 The acquisition project uses metrics as an input to program decision-making. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.4 The performance, cost, and schedule objectives of the software acquisition project are measured and controlled throughout the software acquisition. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.5 Your project team uses measures and analytic techniques for statistically managing selected processes and sub-processes. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13.6 Your project team records statistical and quality management data in the organization's measurement repository and uses that information for decision-making. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

14. The following metrics are reported to the PMO on (at least) a monthly basis.

- ☐ Cost
- ☐ Schedule
- ☐ Manpower
- ☐ Development progress
- ☐ Requirements stability
- ☐ Don't know

Solicitation

15. The following items address whether solicitation packages prepared by the program specify technical needs adequately, and whether the proposal review process succeeds at identifying capable contractors.

Indicate the most appropriate response to each of the following statements.

- 15.1 The selection official has sufficient software technical expertise to select a qualified contractor.
- 15.2 The software-related contractual requirements baseline is established prior to release of the solicitation package.
- 15.3 The solicitation package includes the contractual software requirements and proposal evaluation criteria.
- 15.4 Technical reviewers use proposal evaluation criteria during solicitation activities.
- 15.5 Software risks are independently evaluated as part of the solicitation and are communicated to the solicitation official.

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Software-Related Contractual Requirements Development and Management

16. The following items address whether your project establishes a common and unambiguous definition of software-related contractual requirements that is understood by the acquisition project team, end user, and the contractor team.

Indicate the most appropriate response to each of the following statements.

		Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
16.1	Software-related contractual requirements are developed, managed, and maintained using a structured process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.2	End users and other affected groups have input to the software-related contractual requirements over the life of the acquisition.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.3	A member of the acquisition project staff or a novice engineer could identify and verify the source of software-related contractual requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.4	In the case of new and/or changing program requirements, acquisition project staff know when and how to make changes to contractual requirements, including acceptance criteria.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.5	A formal control board is in place to authorize changes to requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Contract Performance Management

17. The following items address whether your project team ensures that the software activities under contract are being performed in accordance with contractual requirements.

Indicate the most appropriate response to each of the following statements.

		Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
17.1	The project team has sufficient insight into the contractor's software engineering effort to ensure the effort is managed and controlled and complies with contract requirements.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.2	The acquisition project team and contractor team maintains ongoing communication and both parties agree to commitments.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.3	Your project team identifies, documents, and tracks software risks associated with the contractor's efforts, independent of the contractor's risk management process.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.4	The quality of the contractor team's process, performance, products, and services are appraised throughout the contract's period of performance to identify risks and take action to mitigate those risks as early as possible.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Transition to Support

18. The following items address whether projects provide for the transition of the software products being acquired to the eventual software support organization.

Indicate the most appropriate response to each of the following statements.

- 18.1 The acquisition project team ensures that the software support organization has the capacity and capability to provide the required support upon assumption of responsibility for the support of the software products.
- 18.2 The acquisition project team ensures there is no loss in continuity of support to the software products during transition from the development contractor to the software support organization.
- 18.3 Configuration management of the software products is maintained throughout the transition.
- 18.4 The strategy for transition into maintenance is documented, communicated, and agreed to by all parties early in the acquisition.

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Transition to Operations

19. The following items address whether acquisition projects prepare for the transition of the software products being acquired to the end user.

Indicate the most appropriate response to each of the following statements.

- 19.1 The acquisition project team ensures that the end user has the training, experience, and resources to accept the software products into operational use.
- 19.2 The acquisition project team plans for sufficient contractor support during end-user acceptance testing.
- 19.3 The strategy for transition into operations is documented, communicated, and agreed to by all parties in the acquisition.
- 19.4 The software support organization participates in all project and technical reviews.

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

System Developer's Processes

20. The following items address your perceptions of the impact of the contractor's work processes on the success of your software-intensive system acquisitions. Please rate the effectiveness of your contractor's abilities in the following areas.

		Extremely Poor	Below Average	Average	Above Average	Excellent	Don't know or N/A
20.1	Project planning	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.2	Project monitoring and control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.3	Requirements development	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.4	Requirements management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.5	Measurement analysis and reporting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.6	Software architecture development and assessment	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.7	Technical solution	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.8	Product integration	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.9	Configuration Management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.10	Risk management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.11	Verification	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.12	Validation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.13	Supplier or subcontract management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.14	Integrated teaming	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.15	Defined processes that support product development and stable operations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.16	Shares all relevant information that you feel you should know to manage the acquisition effectively	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.17	Causal analysis and resolution for defect prevention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Impact of External Factors on Acquisition

21. The following items address the impact of external factors on the successful outcome of an acquisition program.

Indicate the most appropriate response to each of the following statements.

- | | |
|------|---|
| 21.1 | Mandates from congress inhibit our program from meeting its goals. |
| 21.2 | Reallocation of program funding is a significant source of frustration in acquisition programs. |
| 21.3 | Critical personnel are lost due to military rotations or inability to compete with industry salaries. |
| 21.4 | Acquisition reform has negatively impacted our ability to meet our objectives. |
| 21.5 | Expressions of user requirements throughout the acquisition process causes disruption in the development process. |
| 21.6 | Lack of test bed assets to stress test system under realistic operational conditions is a major problem. |

Strongly Agree	Agree	Disagree	Strongly Disagree	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Where are the major problems and risks?

22. Indicate your perception of the extent to which each of the following areas (22.1-22.4) **contribute to major problems and risks** in the successful outcome of acquisition programs.

When responding, please consider your cumulative experience in acquisition over the last 10 years.

- | | |
|------|---|
| 22.1 | Acquisition program policies and processes |
| 22.2 | The contracting process between acquirer and developers |
| 22.3 | The contractor's (or suppliers) development process |
| 22.4 | Factors outside the control of the acquirers and developers (e.g., congressional mandates; priorities set by engagements of our armed forces, etc.) |

To a great extent	Somewhat	Very little	Not at all	Don't know or N/A
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

23. Overall, what are the one or two most difficult problems that your project has faced in conducting successful acquisition of software-intensive systems. (Please describe)

24. If you could change one or two things about how software-intensive systems are acquired in the Army, what would they be? (Please describe)

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